RAILROAD GAZETTE

FRIDAY, DECEMBER 25.

Locomotive Shop Notes at Boston.

THE BOSTON & PROVIDENCE SHOPS.

The Boston & Providence shops at Boston are of moderate size compared with those of many other roads, but are of ample size for the length of the road (67¾ miles), and being well equipped and kept in excellent condition, appear to be fully capable of maintaining the rolling stock of the road, 57 engines, 130 passenger cars and 1,000 freight cars, in good working order.

No moguls or consolidations are employed on this road, and with the exception of four Forney type engines and a few four-wheeled switchers, all the engines are of the American type.

The shops ceased to build engines some years ago, the company considering it cheaper to buy from the numerous well-known firms of locomotive makers within a few miles of the road, the Rhode Island Locomotive Works at Providence, the Mason Machine Works and the Taunton Locomotive Works at Taunton, the Hinckley Works at Boston, and the Manchester Locomotive Works in New Hampshire. Most of the engines are from one of the three first named makers The older engines are still running with Griggs patent wooden cushioning between the body of the driving-wheels and the tires. As the tire rests on the hardwood packing, and does not touch the body of the wheel, it has a non-metallic and elastic bed which deadens vibration, and should, especially in frosty weather, save both running gear and rails from unduly severe concussions. This practice was introduced in the days of iron tires and rails, and since the advent of steel tires it has been abandoned for new engines. Crucible steel driving tires are now used almost exclusively, some tires of other make used some years ago having been found to give decidedly less satisfactory results. It is only fair to state, however, that since then more experience has been gained in the proper method of making open hearth steel.

Mr. George Richards, the Superintendent of Motive Power of this line, was lately in Europe, and was one of the very few visitors who have succeded in gaining admission to the famous Krupp steel works at Essen. He saw a ten-ton crucible steel casting being poured, and an enormous 70-ton steel casting being very gradually cooled, the outside being warmed with coke fires until the inside had partly solidified, when the block was to be hammered into shape to form the main piece of an immense gun. The enormous array of furnaces in which the crucibles are heated, and the perfect manner in which a large number of men (in some cases 800) all lift their 80-lb. crucibles out of the furnaces, and pour them into the mould in rapid succession, is described as being a wonderful sight. The scrupulous care bestowed upon the minutest detail was a noticeable feature about their manipulation of steel. If, after extended trials, a certain practice or proportion of ingredients had been found to give the best results, that practice was absolutely and exactly adhered to and the common phrase, "O, that's near enough!" appeared to have no place in the vocabulary at Krupp's works.

On this, as on other New England railroads, some old inside connected engines may still be found. One of these engines with 17 in. cylinders was the last built at the railroad works. In her day she was doubtless regarded as *the* engine of road, and ran the smartest train; but she is now relegated to the gravel train, a monument of fallen glory. The barrel of the boiler is very long (12 ft. 2 in.); and as her drivers are close together, and her truck has a very short wheel-base, the great gap between the main drivers and the hind truck wheels makes the barrel look all the longer. The tender is carried on eight wheels arranged in a rigid wheel-base, a style of tender once extensively used on New England roads. Mr. Richards informs us that, strangely enough, the flanges of the wheels cut less than on tenders carried as usual on two trucks. The explanation is that the truck wheel-base is generally so short that the wheels have a tendency to get across the road until brought up by their flanges coming in contact with the sides of the rail. This produces a wandering motion, the truck running first to one side and then to the other, and at each swing the flanges assume a considerable angle with the rail, and this angle has, of course, great influence on the cutting of the flanges. While, however, the rigid wheel-base would be free from this wandering motion on a straight track or on a curve of easy radius, it would doubtless be at a disadvantage on sharp curves. In these old tenders four semi-elliptical bearing springs are used, each spring spanning two axle boxes. The wheels are, therefore, equalized as regards the vertical inequalities of the road.

The latest passenger engines on the road have 18 × 24 cylinders and 68-in. wheels. The freight engines have 60-in. wheels, but all engines are fitted with the Westinghouse brake, so that any engine can take a passenger train. The Forney type engines are used for suburban passenger service, making a trip of about 10 miles out of Boston. The time lost in turning at either end of the trip makes an engine which does not require turning a every convenient institution. The stops on this service are very numerous, there being 130 stops in a day's work, 140 miles. The latest Forney engines carry a considerable supply of water, 1,900 gallons, and weigh 112,000 lbs. The cylinders are 17 in. × 20 in., and the driving-wheels 57 in. on tread. The truck under the hind end has six wheels.

The recent engines have the extension front, but owing to the difference in the weight and speed of the trains, and variations in the cylinders, valve gear, etc., of the engines, it has been impossible to determine whether the extension front effects any economy of fuel. The fire-brick arch has been in use on this line since 1857. Probably many will be surprised that the fire-brick arch was known as far back as 28 years ago.

THE OLD COLONY SHOPS.

The shops of the Old Colony road have built nearly half of the engines and cars required by that prosperous company, and are at present engaged in building some fine passenger engines which will exceed in power and weight any engines at present on that road. The cylinders are 18 in. × 24 in., and the wheels measure 68 in. on tread. The tires are no less than 4 in. thick. Mr. J. N. Lauder, the Superintendent of Rolling Stock, argues that the ordinary driving tire, 3 in. thick, has to be thrown away when it is worn down to half its original thickness. With a 4-in. tire, the extra thickness is pure gain, and can all be worn fairly away. Some trouble has been experienced lately on this road from engine frames breaking, and in order to prevent this in future, the frames of the new engine are no less than 5½ in. deep by 3 in. thick. The pedestal jaws, where welded to the main frame, are of the same dimensions. This heavy frame will of course assist in giving weight where it is most needed—at the hind end.

The boiler barrel is 52 in. diameter inside the smallest ring, the barrel being made in two plates only. The dome is placed over the fire-box, which has a wagon top. The fire-box measures 78 in. long inside. The mud ring is 4 in. deep by 3 in. thick, double-riveted. The boiler is designed to carry 175 lbs. working pressure, and has therefore been made of extra strength throughout. The shell is composed of 7-16 in. steel double riveted. The sides of the inside fire-box are 5-16 in. thick; the crown ⅝ in. and the tube sheet ½ in. The barrel of the boiler is 11 ft. 6 in. long, and 224 tubes 2 in. diameter are used, placed ⅝ in. apart.

Engines with 17 × 24 cylinders recently built are of slightly smaller dimensions, the tires being 3½ in. thick, and the barrel 50 in. diameter, with a 72-in. fire-box.

An extension front is used on all engines, and while it is not considered to effect any economy of fuel, it undoubtedly lessens the amount of dirt thrown from the stack. Sparks can be extinguished and blown off on either side of the engine by a jet of hot water, a neat and simple arrangement devised by Mr. Lauder. A brick arch carried on tubes is used.

The side rods are of deep rectangular section, with solid ends. The brasses are made of two halves, and any wear can be taken up by a cotter. The main part of the rods is not machined, and is painted straight from the blacksmith's shop, the edges being rounded off so as not to cut the hands.

The following summary shows the work performed by the engines of this road during the year ending Sept. 30, 1884:

Miles run:	
Passenger trains	1,727,617
Pass. switching	89,531
Freight trains	725,889
Freight switching	573,135
Working trains	270,772
Total	3,386,944
Engines of passenger and freight trains are allowed actual time-card mileage; switching engines allowed 6 miles per hour; work train engines allowed actual mileage between stations, and 6 miles per hour while dumping and loading.	
Number of engines in service (average)	119
Average miles per engine	28,462
Cost:	
*Repairs	$126,401.12
Fuel	304,789.21
Oil and waste	17,096.06
Wages—engineers and firemen	202,880.01
" wipers	23,086.26
Total cost	$674,252.66
Cost per mile in cents:	
*Repairs	3.73
Fuel	9.00
Oil and waste	0.51
Engineers and firemen	5.99
Wipers	0.68
Total	19.91
Miles run to 1 ton coal (2,000 lbs.)	44.45
Miles run to 1 pint lubricating oil	13.60
Miles run to 1 lb. wiping waste	67.41

*Include labor and material on new engines being built at company's shops.

The New England Railroad Club on Springs.

The discussion on car seats at the last meeting of the New England Railroad Club, which was published last week, was followed by one on car springs, of which a summary is given below:

The CHAIRMAN: We will now take up the other question, "the Combination of Springs best adapted to Cars and Locomotives;" and "Which is best for freight cars, the Spiral or the Elliptical Spring?" The arrangement of springs for engines has got down to a solid basis, and whatever we might say here would not affect the form of springs for this purpose, or the method of applying them or their arrangement in the slightest degree, because the present arrangement of springs for locomotives has been brought about by the necessities of the case. Elliptical instead of spiral springs may possibly some day be used for the equalizing bar in car trucks. The distance of the equalizer springs from the centre affects the riding of the car. The main thing for the proper riding of a passenger car is to have the equalizing bar springs of just the right tension. The bolster springs have very little to do with the riding. Many will not agree with me, but I have come to that conclusion within the last two years by observation as to the riding of the cars on the Old Colony. We have a peculiar spring in our passenger cars, devised by Mr. Gleason, formerly Master Car-Builder of the road. They give excellent results. I came on to the road prejudiced against them; but I think we have as good easy-riding cars as there are in this country. Spiral springs are used on the bolsters, but on the equalizing bar the springs have a very soft and easy motion, for those springs have just the right weight and tension to hold the car up. They have also the further advantage of being very cheap.

Mr. ADAMS: The elliptical spring is universally considered the best, but the difficulty of using the elliptical spring on the equalizing bar has prevented their use. The time will come when we shall use elliptical springs all around. A car hung with elliptical equalizer springs would be easier than any other. European cars are generally hung on 7 ft. semi-elliptical springs directly over the wheels, without equalizer bars or body springs. The wheel spring is the important spring; but the body spring should not be very rigid. The softer the spring, if of sufficient strength, the better the car will ride. A long flat elliptical spring gives an easy motion. We have one car hung on side elliptics, and it rides very easily. The elliptics are 48 in. long, not so long as we would like, but as long as we could get into a truck of that construction. We did away with the equalizing bar, and, in order to get as light a truck as possible, put in long elliptical springs in the jaw over the wheel. The weight of the truck is considerably less, and it still rides well. An elliptical wheel spring would be superior to anything now in use. The old-fashioned style was a combination of rubber and steel—rubber equalizing springs and elliptical bolster springs; but there are no good rubber springs now made, and consequently we now use spiral springs.

Mr. A. GRIGGS (Providence & Worcester): I have changed a great many equalizer springs last year, leaving the elliptical springs just as they were. Unless the boxes are free in the pedestals, the spring doesn't do much good. Much depends on getting the proper weight and tension of spring. We have proved on a great many of our cars that two-thirds of the good, easy riding of the car is in the equalizer spring. We have made no other changes except planing all the boxes on top, and putting equalizing bars under the spirals. By a great deal of pains we have made a great improvement in our riding cars. The spring wants to be of as large diameter as you can get in, and the bar wants to be as nearly flat as possible, in order to get an easy motion. Otherwise you get that short, quick motion and trembling of the car.

Mr. LITTLE: The spiral spring has a short, jerky motion, and the elliptical spring has a long, easy motion. The springs should be so arranged that the action should be two to one, and not three to one, so they will all go and come alike, not the bar spring coming up as the elliptical spring is going down. This can be ascertained by testing the motion of the elliptical, and then the motion of the coil spring, and getting them to work uniformly, so that the coil will go down and come back with the elliptical.

Mr. ADAMS: The motion of the spiral depends upon the length of the coil. The movement has to travel through the length of the steel, and the longer the coil and the larger the diameter, the slower the motion will be.

Mr. LAUDER: The body bolster that sets on the springs should be so strong that there will be no springing up when the weight is put on. If it is not perfectly rigid it acts as an imperfect spring, giving a trembling motion. The bad riding and trembling of cars often arises from the weakness of the body bolsters. Spiral springs are much used because they can be produced for less money, and elliptical springs cannot be applied to the equalizing bars of passenger car trucks. I thoroughly believe in elliptical springs for both freight and passenger cars, and we put them into the last cars that we built. They cost about three times as much as spiral springs for the cars would have cost, but it seemed to me money well spent. Double elliptical springs for a freight car will cost in the neighborhood of $35, and spiral springs a little over $11; and I presume springs are put under freight cars to-day which can be bought for $8 or $9, but I think in the end the railroads will be the gainers by using elliptical springs.

The following letter from Mr. John Kent (Aaron, French & Co.) was then read:

"An elliptic spring gives the best results, but as it occupies a considerable space, it cannot always be used. A spiral spring will be more durable and ride more easily than an unduly short elliptic spring. Trucks should be constructed to admit of long elliptic springs. Spiral springs are often made either too large or too small in diameter. If the diameter of a spiral spring is too large the section of bar must be increased to give the proper strength, and hence the section is so large it cannot be properly tempered. If the diameter of the spring is too small the spring rides too rigidly and weight of steel is saved at the expense of elasticity and durability. The happy medium can be ascertained by considering the weight to be carried, and constructing a spring accordingly. Spiral springs are often made so strong that easy riding is impossible, in some cases the carrying capacity being five times the actual load. Such a spring would have no more elasticity than a block of iron or wood. Too much reserve power is as bad as not enough capacity. Every practical spring manufacturer knows that there is a limit to the maximum capacity."

The CHAIRMAN suggested that the subjects for discussion at the meetings be selected a month in advance, in order to give the members time to prepare themselves to discuss them.

A member proposed for future discussion the subject of Road-bed and Track. The Chairman thought it hardly a proper subject for the club to discuss, as the members are not experts in regard to it, and it more properly belonged to the chief engineers and roadmasters to deal with. The meeting then adjourned.

The Outside Painting and Varnishing of Cars.

The following paper was read before the Master Car-Painters' Association at its last convention in Toronto, by Mr. Wm. Davis, Master Painter of the Canada Southern road:

I will endeavor in this paper to lay before you a few thoughts on the Outside Painting of a Passenger Car. It is somewhat embarrassing to me to lay before you or embody in those thoughts anything that may enlighten you, as we have discussed the outside painting of passenger cars time and again, as well as given the modus operandi employed by different car painters, and yet, gentlemen, what decision have we arrived at as an Association? Have we arrived at a uniformity in this matter? I will venture to say that there is just as much difference of opinion now as there was years ago under these circumstances. I will only speak or, as it were, generalize, on a few points in connection with this subject, and if possible see what progress has been made by this Association in the matters of beauty of finish, durability, and economy in the painting of passenger cars.

First. We will take a glance at what many of us consider the most important step of all, and which is, in fact, the basis or foundation upon which we build the structure of painting, ornamenting and varnishing our passenger cars—the Primer or Filler. I have no doubt that all know what constitutes a good and reliable filler; and unless we do, and see to it that it is properly mixed and properly applied, all our labor of painting, etc., will be useless, and inevitable troubles will be sure to follow. Now, gentlemen, as most of you are aware, there is a great diversity of opinion as to what is the best primer. Some advocate lead and oil, while others again advocate one or other of the different patent fillers that are in the market. Should we not be a little cautious how we accept the latter? They may be good; but unless we know their formulas or thoroughly know their component parts and have tested them, and are assured by these means that they are better and cheaper than our old standards, we should not

adopt them; on the other hand, if they are good, we would only be doing justice to all to adopt their use.

We next come to the Surfacing, or Rough Stuff. How far, gentlemen, are we a unit in this matter? Some claim that scraping is the best, others some patent surface, while the rest adhere to the old-time method of rough stuff, and a few don't believe in a great amount of surfacing, claiming that it is the chief cause of blistering, cracking, and in fact, mostly all the deviltries that a car is heir to. Now, while the writer agrees with the necessity of surfacing, and, in fact, cannot see well how it can be done without, yet, if there is any trouble arising from this cause, it is invariably the fault of the painter; and I have no doubt that a great amount of the cracking, blistering, etc., is caused by the injudicious mixing of rough stuff as well as the method of rubbing. We are very apt to lay the blame on the varnish; and I may say here that it is a good job for us that the varnish makers and their agents are a long-suffering people, willing to bear the burden of others on their shoulders, or we might long ago have been wiped out of existence. We cannot use too great care in mixing our rough stuff or surfacer. It should be mixed as elastic as time will permit, and rubbed as close as possible, being careful not to rub through to the wood, and after the rubbing is completed care should be taken as to the nature of the next coat of paint we put over the surfacing coat. This coat of paint should be elastic enough to allow the surfacing coat to absorb all it requires to fill up its porous and spongy nature, and yet have sufficient binding properties to form a good, hard, solid surface to put our finishing or color coats upon. I believe some put their flat, hard color coats on top of their surfacing coat, and whatever small amount of vehicle there was in the first color coat is absorbed by the porous nature of the surface coat, and thus nearly all affinity between the two coats is lost, and in time flaking necessarily follows.

I shall next give my ideas on the Color Coats in this part of the work. I have no doubt some will differ from me in opinion. My own opinion is, that instead of making your color coats a dead flat by mixing them only with turpentine, a small portion of oil or finishing varnish should be added, just sufficient to bind your colors and allow of their falling down nicely. Do I believe in the method of putting on two coats in one day? By all means, I think we should allow 12 hours at least between coats, and more, if possible. By adopting this plan, I get a good surface on which to do all my ornamental work, and besides, while the striping and ornamenting are going on on the flat color coats, time is given for the whole to harden.

Very little can be said here on the subject of ornamentation, but I am pleased to say that there is a very marked improvement both in regard to quantity and quality. It shows very bad taste and very poor economy to cover our cars indiscriminately with ornamental work without due regard to thought and character. Would it not be better to confine the ornamentation to the most prominent parts, such as corner posts, sign-boards, etc.? We should also give attention to harmony of colors. For instance, let the sash, corner posts and sign-boards be in harmony with the body of the car. The harmony of coloring is a beautiful study, of which we should all avail ourselves, as it will well repay us for the trouble.

And now we come to the last process necessary for the finish of our passenger cars, Varnishing. There has been a great deal written and said on the deviltries of varnish, and truly their name is legion: and as I said before, the varnish-maker comes in for a great share of blame, and perhaps unjustly so. But I need not say more on this subject; you are all aware of the troubles and annoyances incidental to varnishing. As far as I am concerned, I have very little trouble—only what is incidental to change of atmosphere and others that we have no control of. Many of you use outside rubbing varnish; so did I, several years ago, but I have discarded its use nearly altogether, using finishing varnish with a small portion of rubbing added, and upon this coat I rub very lightly—just sufficient to take off the nibs—using, at the same time, a rubbing brush that we have made for the purpose. I finish up with two coats of finishing varnish. Thus you will see I insure durability as well as economy, as I believe troubles will arise by the too frequent use of rubbing varnish on the outside of passenger cars. And now, gentlemen, I will say, in conclusion, that unless we can study the theory or science in painting to a certain extent, as well as have the practical part, we will not be able to arrive at a standard method of painting a car, or understand what has been the cause of these troubles that we have to contend with, for it is an old saying, that "every effect has a cause;" and unless we set our minds to study these things we will have always to contend with failures. But, on the other hand, he only who studies all these effects, as well as the true beauty of ornament, and also the science of coloring (for the harmony of color is a theory or science in itself), can prove successful in painting and decorating our passenger cars.

The Watts Combination Tail Lamp.

The accompanying illustrations represent a form of tail lamp that has been introduced on the Pittsburgh, Cincinnati & St. Louis, the Louisville, New Albany & Chicago and other railroads, and has met with much approval.

Fig. 1 represents the lamp in position on the side of the rear car.

Fig. 2 shows that the lamp is placed in position and can be inspected from the inside of the car.

Fig. 3 shows the interior of the lamp, which contains two combustion chambers.

Fig. 4 represents the lamp attached from the car and ready for use as a hand lamp.

As will be seen from the engravings, the lamp differs from ordinary tail lamps in being placed in position from the inside of the car, a hole in the side being cut for that purpose. The lamp is divided into two compartments, the lower fitted with a red lens and the upper with green glass. The burner can be placed in either compartment, and thus made to show either a red or a green light, thereby indicating to approaching trains, "clear of main track," or vice versa, when "main track is obstructed."

As the burner is accessible from the inside of the car, it can be retrimmed and filled without removing, and quickly withdrawn to clear obstructions. It lights up the interior of the car, therefore it cannot be extinguished without quickly being discovered. Either carbon or signal oil, with proper burner can be used with equal results. One hundred and fifty degree carbon oil is standard on the roads now using the lamp. It can be readily and conveniently used as a hand lamp, displaying any color desired.

The bull's-eyes or lenses face square to the rear, the beam of light showing where most needed, which is not always the case where lamps are hung on side of car or secured to the platform. The ventilation is obtained from the car direct, and to insure perfect combustion the lamp door can be left open without fear of flame being extinguished.

The lamp appears to be cheap and simple in construction, though somewhat bulky and clumsy looking in form. All the glass is either leaded or puttied to prevent draft, and no springs are used.

Any further information regarding the lamp may be obtained of Mr. Charles Watts, Superintendent Chicago, St. Louis & Pittsburgh, Logansport, Indiana.

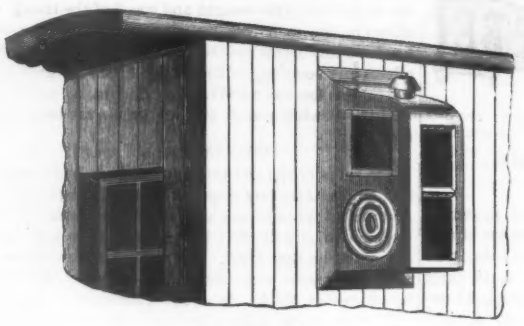


Fig. 1.

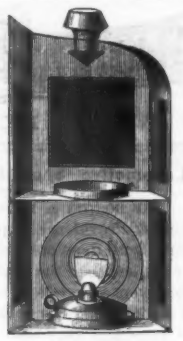


Fig. 3.

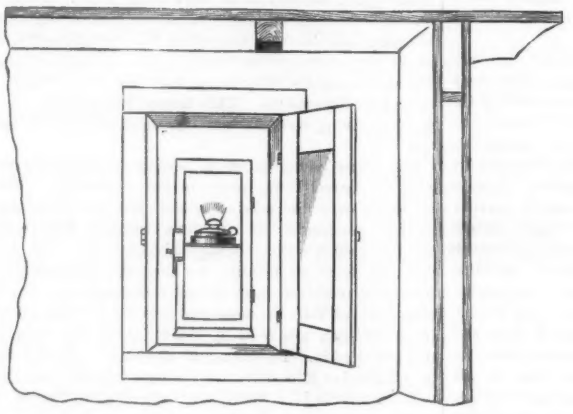


Fig. 2.

Fig. 4.

WATTS' COMBINATION TAIL LAMP.

The Baltimore & Ohio School for Apprentices.

In our number for Feb. 13 last, page 100, we published the order of President Garrett establishing a school of technology in connection with the shops of the Baltimore & Ohio Co., with the regulation then established for its conduct. The following account of this new school in operation reminds one of the schools and shops for instruction of the Prussian State Railroads, which were described in the *Railroad Gazette* of Jan. 7, 1881 (page 1), and in some recent numbers:

The opening of the Baltimore & Ohio Technological School for the training of its apprentices took place in January, 1885, and is consequently in a formative state; but as a development of a work already so wonderfully successful its future as a power in the system of industrial training for the youth of this country is already assured. The system of apprenticeship which, in later years, has fallen almost entirely into disuse, has never been abandoned by the Baltimore & Ohio Co. At the beginning of the present year the apprentices in the service of the company numbered 500 boys, 150 of whom were employed in the shops of the company at Mount Clare, near Baltimore. The Technological School, although forming a part of the original plan of Mr. John W. Garrett, owes its actual organization to his son and successor Mr. Robert Garrett, who is a zealous advocate of industrial and technical training for the working classes of the country, as furnishing a powerful means of increasing their material prosperity and happiness. The object of the school is to promote the higher literary and technical education of the apprentices, with the view to their occupying positions of trust and responsibility in the service of the company, as foremen of shops, engineers, draughtsmen, etc. In January of the present year, in pursuance of this object and as a preliminary to the opening of the school, the apprentices at Mount Clare were subjected to an elementary examination in the common English branches by a board of examiners appointed by Mr. Robert Garrett. Only 40 boys passed this examination satisfactorily; the remainder of the 150 could barely read and write. The fact that so few of the boys under the old system of apprenticeship had attained higher positions in the service of the company had already awakened grave misgivings in the minds of the officers whether the lack of a better literary training as a means of awakening the powers of thought and observation had not prevented the apprentices from reaching a higher standard. This thoughtful interest on the part of the leading officers gave rise to the desire for the school. Dr. Barnard, the organizer of the Relief Association, was placed in charge of the foundation of the school. He was assisted by Mr. Charles W. Scribner, a graduate of Stevens Institute, Hoboken, and who had already achieved much success as a practical bridge draughtsman and as a specialist in technology. A new set of regulations relating to the appointment, admission and services of apprentices was promulgated by the President, superseding all previous rules and containing many new and admirable features. It was made one of the conditions of the admission of an apprentice to the employ of the company that he should sign a paper agreeing to attend the technological school, and also changing the age of admission from 17 to 15 years, thus giving an opportunity for a longer course of instruction. The students are required to wear in the school and on all public occasions a prescribed uniform, which is furnished by the Purchasing Agent—the first suit free and all renewals at the expense of the student—the payments, however, being arranged in installments. As the Baltimore & Ohio Railroad Co. contributes the whole expense of educating the apprentices who pass the preliminary physical and educational examination, it exacts the privilege of availing itself of the services of such as are competent for its purposes at fair salaries for at least three years after graduation. The apprentices are graded, according to ability and intelligence, into three classes, and are paid at the following rates per day for their services:

Year.	First class.	Second class.	Third class.
First	.70	$1.00	$1.50
Second	.80	1.12½	1.75
Third	.90	1.25	2.00
Fourth	$1.00	....	....

As an incentive to efficiency, industry, and the care of its property the company will give to each of its apprentices at the completion of a full course, whose record has been satisfactory and praiseworthy, a sum equal to 8⅓ cents per day for each full day they serve in the first class and 12½ cents for each full day in the second class. A pupil of the first class would thus receive $110.40 if no days were lost, and in the second class $117.36. Students who are admitted outside of the service, while under the same pay from the company as the other apprentices, are charged full tuition for instruction in the technological school. Sons of wealthy men have already made application for admission, as the benefits of a system of technical education which combines the best theoretical instruction, with a shop practice in the magnificently appointed shops of the Baltimore & Ohio Co., where all that is newest and best in mechanical appliances is always in use, is readily seen and appreciated. On the completion of their full course the apprentices will receive diplomas which will entitle them to the preference over all other applicants for positions of responsibility in the gift of the company. The apprentices are also required to become members of the Relief Association, and are entitled to all the benefits of its savings fund.

On Feb. 1, 1885, the school took possession of the large and handsome building which had been erected expressly for its use, and the first session began with the 40 students who had passed the required examination. The class rooms are spacious and well arranged, with a large drawing-room provided with raised desks, and brilliantly lighted by numerous easily adjusted gas jets, and surrounded by blackboards for the illustration by the teacher of the principles of mechanical and free-hand drawing. The principal sessions of the school are held in the evening, as the day is devoted to work in the shops, where practical instruction is given by Mr. Scribner. The school contains a large circulating library and reading-room supplied with the best and newest literature of the day, and particularly rich in scientific books and journals, the most recent works on steam and steam engines, the lives and works of inventors, etc. One feature of the library is particularly worthy of mention. By means of library committees appointed at all the principal stations, any apprentice on the line of the road can, by selecting a book from the catalogues have it sent and returned free of charge. He can also obtain the necessary books and apparatus for following the course of the technological school. Thus the benefits of this excellent library are shared by the apprentices all along the vast line of the Baltimore & Ohio Railroad. Children of employés, living in districts remote from the public schools, are passed free over the road to the nearest school. The fine physical and chemical laboratory, which was established for the use of the employés, is of great service to the students. Here they are taught to test the lubricating and other qualities of oils, to analyze the different metals which enter into the construction of engines and machines, as well as the analysis of the water used in engines and for domestic purposes along the line of the road. The literary training of the apprentices is in charge of Mr. Coles, a practical machinist, and thoroughly acquainted with the best methods of similar schools in Europe. In view of the necessity of postponing for the present the whole programme of the technological school, only such literary training is attempted as has a direct bearing upon the shop work, which now includes the common English branches—algebra, geometry, and elementary physics. Considerable progress has been made in free-hand and mechanical drawing.

The special feature of the Baltimore & Ohio Technological School consists in the fact that an instructor accompanies the boys into the shop and instructs them when at work. It is

claimed at Mount Clare that this is not done in any other school of technology. The technological instructor exercises a general supervision over all the apprentices in the shop. He sees that they are kept at such work as he directs and that they do their work in such a way as will tend to make them skillful and efficient workmen. Having assigned a boy to a particular shop, he there performs his work under the joint direction of the instructor and foreman. The instructor has authority from the General Manager to talk with any boys at work in the shops about their work, to question them in order to see how well they understand what they are doing, to make explanations, and to direct their operations in such a way as to enable the apprentices to gain a comprehensive knowledge of the nature and principles of their work. For this purpose Mr. Scribner spends six hours daily in the shops and two hours in the drawing room. A certain number of hours are set aside in which an instructor assembles the apprentices for the purpose of explaining and illustrating the scientific principles that are involved in the work on which they are actually engaged or in suggesting the most economical methods of work, showing how the different parts of machinery are put together and pointing out the office of each part. He also gives instruction in the use and care of tools and machinery and the nature of the materials used. The boys are at present trained as machinists, brass finishers, carpenters, steam and gas pipe fitters, molders, upholsterers, draughtsmen, painters, bridge builders and engineers.

Details of English Tank Locomotive.

We are indebted to *Engineering* for the accompany illustrations, which represent details of an English tank locomotive, designed for working accommodation passenger trains on the Taff Vale Railway, a Welsh coal road. The engine is of the American type, with rectangular side tanks placed on each side of the boiler above the drivers. The leading dimensions of the engine are as follows:

Cylinders, diameter and stroke	16 in. × 24 in.
Driving wheels, diameter on tread	63 in.
Truck wheels " "	33 in.
Driving wheel base	7 ft. 10 in.
Truck "	5 ft. 9 in.
Total wheel base	20 ft. 6½ in.
Boiler, length between tube plates	10 ft. 3 in.
Boiler, mean diameter barrel	50 in.
Inside fire-box copper, length and width	50⅛ in. × 41⅛ in.
Tubes, brass, number and external diameter	194 × 1¾ in.
Heating surface tubes (external)	874 sq. ft.
" " fire-box	82 sq. ft.
" " total	956 sq. ft.
Grate area	16 sq. ft.
Boiler pressure	140 lbs.
Weight in working order:	
Truck	31,360 lbs.
Main drivers	33,600 lbs.
Hind drivers	33,600 lbs.
	98,560 lbs.
Capacity of tanks	1,152 gallons.
" " coal box	2,800 lbs.
Extreme length over buffers	30 ft. 9¼ in.
Length over bumper beams	27 ft. 9¼ in.

The crosshead (figs. 5 and 6) is made of annealed crucible steel, the bars being of case hardened iron, and the rubbing pieces of cast iron.

The crosshead end of the connecting rod (figs. 7 and 8) is solid, without any straps, the wear being taken up by a horizontal key set up by a screw. It will be noticed that this key is provided with a safety guard, so that in case it slacks back it cannot fall out on the road and cause a bad break down.

The cylinder cocks are shown in fig. 10. They are kept tight by the steam when pressure is on, and are held to their seating by a spiral spring at other times. This facilitates the valve being ground to its seating, and allows dirt or particles of scale to escape without wearing grooves in the plug. All the mountings on the boiler are of this description, excepting in the case of the gauge glass fittings, where it is, of course, necessary to have cocks or valves that will remain open.

The driving axle-boxes are shown in figs. 11 and 12. It will be noticed that, as usual in English engines, the springs are hung underneath the box by means of pins and links. The guides or rubbing pieces in which the driving boxes work are shown in figs. 13, 14 and 15. The guides are made of cast iron and are bolted to the plate frame. A hardened cast-steel liner is used instead of a wedge. This is gripped firmly by two bolts. When it is desired to take up the wear, these bolts are slackened, and thin steel strips of the proper thickness slipped between the liner and the axle box guide. The bolts are then screwed up tight, gripping the strips and making a firm job.

The blast nozzle is of a special form, being arranged so that the orifice can be opened to ½ in. greater diameter, and it can be shortened by a couple of inches in height. Mr. Riches, the Locomotive Superintendent of the line, and designer of these engines, has found by experiment that this blast has enabled freight engines to work at a reduction of fuel of as much as 4 lbs. to 5 lbs. per mile compared to the ordinary form of blast.

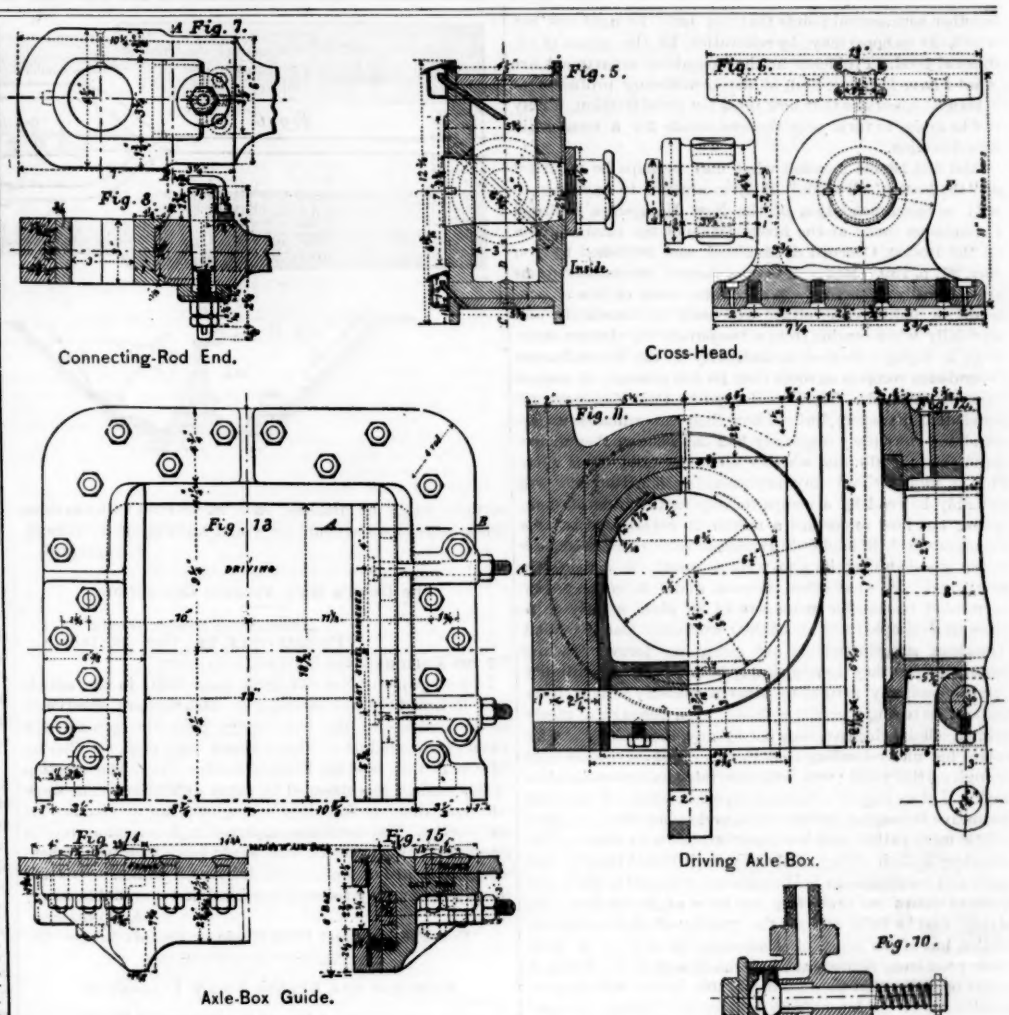
The truck is so arranged that the whole of the weight is carried by eight radiating links, which compensate one another and allow the truck-frame to arrange itself to any cant of the road without being affected by the main engine frames. This, together with 3¼ in. lateral play, and the ability to turn freely upon the centre, makes the engine very easy running on curves. The engine is fitted with the automatic vacuum brake.

There are two small snow ploughs set at an angle of 45 deg. to the road. They consist of an iron plate, the lower edge of which finishes 3 in. above the rail, but a sheet of india-rubber ⅝ in. thick is carried to the top of the rail.

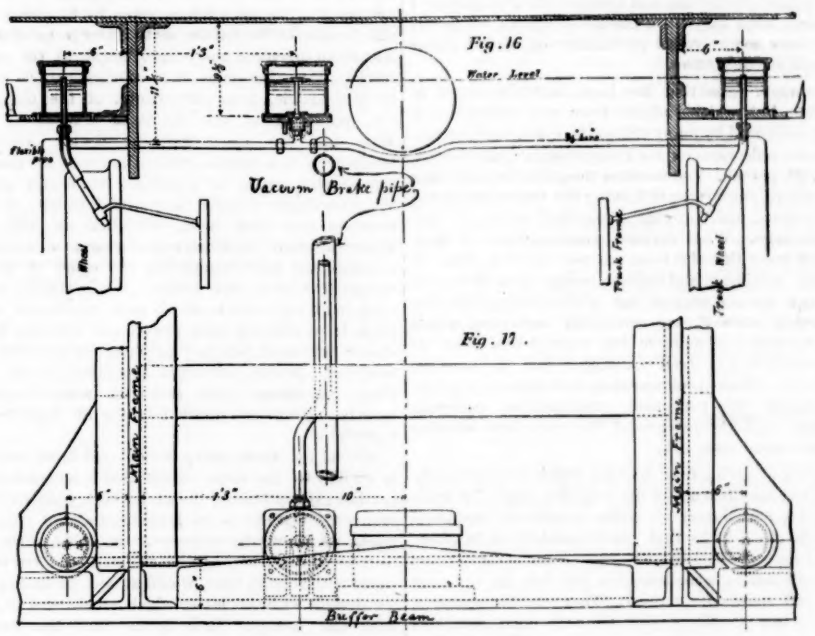
Figs. 16 and 17 illustrate a very neat arrangement of wheel flange lubricator introduced by Mr. Riches. It is for lubricating the flanges of leading wheels when running round curves. There are three small vessels, one placed on either side and the other in the centre of the leading end of the engine under the foot-plate, as shown. The middle vessel is a closed tank, which is connected with the others by means of a ⅝ in. copper pipe. It is also connected with the tender or feed-tank by another pipe on which is arranged a small inlet valve worked by a float in the vessel, and this float admits water up to a certain level only. In each of the two side vessels is fixed a small syphon, the top of which stands at a certain height above the ordinary water level, so that no water will flow out through the syphon unless the water level is raised above its top. From the syphon a pipe passes down to deliver the overflowing water on the flange of the leading wheel. Water is put into all three vessels until it rises to a height at which the float closes the inlet valve. When the engine is running round a curve the water will flow by centrifugal force to the outside of the curve, when it rises in the vessel at that side and flows over the top of the syphon down to the flange.

A very small jet of water from the boiler, directed upon the rail in front of the driving wheels, is used to wash the rail when greasy. This arrangement has been found to answer well and saves a considerable quantity of sand.

The boiler of the engine under notice is of the ordinary type. The direct fire-box stays next to the tube-plate are arranged to give a clearance of at least $\frac{3}{16}$ in. to allow for expansion. The boiler is coated with the "Eagle" non-conducting cement.



DETAILS OF ENGLISH TANK LOCOMOTIVE.



Flange Lubricating Arrangement.

Contributions.

Testing Employes for Knowledge and Obedience to Rules.

TO THE EDITOR OF THE RAILROAD GAZETTE:

"A word to the wise is sufficient," and I conclude that you believe in this maxim when you dismiss some quite important subjects with a very brief lecture. That you state the truth and state it plainly, and that you lay it with reasonable prominence before those who need it I don't deny; but when I see how dull these latter are in grasping it, I long to get behind and *push* home some of the valuable truths that they allow to go to one side or over their heads. Perhaps you give managers credit for too much wisdom, and so place undue reliance on one-word essays; but however that may be, *I* give them credit for a good share of that quality which demands "line upon line," and so take the liberty to group

together here several points that you have brought out, but which (let us hope) may, by reiteration, be the means of additional good. Problems in the operating department are what I have in mind; and, in the bewildering profusion of "traffic" questions that now press for consideration, it may not be amiss to turn your readers' minds for a moment in this direction.

And first let me mention what may perhaps be regarded as "the least of all seeds" likely to amount to anything, to wit: a recommendation of the New Hampshire Railroad Commission made at the investigation of the fatal collision on the Boston, Concord & Montreal, and published by you Nov. 27, p. 759. Railroad Commissioners' recommendations are generally quite likely to encounter more or less of contempt or indifference, either expressed or concealed; and especially when coming from a *comparatively* obscure state. Even so highly esteemed an authority as the Massachusetts Commission receives no more than its due measure of respect from the railroads. The New Hampshire Commission recommends that managers *find out* how their subordinates understand the rules (they might say find out whether they understand them at all), and whether all understand them alike. This is said without any argument or flourish, and will probably be read by a comparatively small circle of managers; but how important a matter it covers, and what a monstrous lack it implies! Doubtless the Commission took it for granted that its due weight would be universally recognized. In what other business would it be necessary to remind responsible managers of so plain a duty as to learn these simple facts about their workers? Can it be that American superintendents are going on forever risking human lives as they do now simply because the responsibility can be nominally shifted to other shoulders? Everybody knows that telling a person a thing, even through a nicely printed official circular, does not by any means universally insure his understanding that thing. You have shed light enough on this point; why will superintendents remain in the dark? Let us import a German superintendent, or else put the native through a Turkish bath, or do *something* to induce a little more patient and intelligent attention to details. The directors in their eulogy of Mr. Vanderbilt said that he was rigid and inexorable in holding his subordinates to their important duties (of protecting the lives of passengers); implying that he fully realized the gravity of their responsibilities, but of his army of lieutenants (as well as of most other presidents' lieutenants) how much nearer the truth it would be to say that they are inexorable in the infliction of penalties *after* the lapses from duty occur? Taking precautions against danger in the thousands of cases where no danger is imminent is a monotonous and irksome duty, and superintendents have frequent occasion to read a lecture on this point to their enginemen who forget to look at switches and brakeman who omit to flag; but the superintendents themselves are guilty of violation of the very same principle when they neglect to examine and teach *all* their employés of a certain class, after they have plainly seen from single examples the sure and universal probability of certain lapses under certain circumstances.

Another danger signal that has been faithfully shown in your columns, but which, judging from past experience, is likely to go unheeded by many who see it, is the warning embodied in your reflections on the Pennsylvania Railroad collision (Oct. 23, p. 680). You mention the probable prevalence of a habit among enginemen of looking for *trains* (obstacles) instead of *signals*, which are the prescribed means of discovering obstacles. What division superintendent is there who does not know that this is an all too common phase of carelessness? Accidents and narrow escapes, and still other escapes which are not narrow, but which illustrate the tendency precisely as well, are constantly occurring, which prove that runners (and many of the reputed best ones) do *not* hold themselves to a strict compliance with the simplest rules for safety. What is plainer than that division superintendents should "by periodical examinations ascertain whether their employés understand the rules, and whether they all understand them alike?"

The practice of giving false alarms, which is so generally adopted to test the efficiency of fire brigades, might be made the means of much salutary discipline on railroads, and there seems to be no other device that can adequately fill its place. Unexpected testings of fidelity are, indeed, made use of more or less on railroads in some branches, but only in the most desultory and spasmodic manner. They ought to occupy a well defined and prominent place in every superintendent's scheme of management. The only sure way of knowing that an engineman is looking for a stop signal is to *use it for the purpose of stopping him.*

I have already arrived at the point where I must apologize for spreading over so much paper, but I must just touch upon your remark concerning the relative merits of human and mechanical block signals. There is, indeed, wide-spread doubt whether human fallibility should be depended upon so much as it is; but is it not time that some of this doubt gave place to certainty? Many electrical devices are so well time-tested that nothing but severe poverty should justify managers in ignoring them as they do. I am no partisan of the Union Switch & Signal Company, but their track circuit block system has merits which no ordinary drawbacks should be allowed to obscure; and I suppose every one acknowledges that if it had been in use at Meadows on the 18th of October, in all human probability that terrible collision would not have occurred. The news columns of the *Railroad Gazette* have more than once testified to the appreciation accorded the "gridiron" signals by enginemen, even of roads that have left out some of the best features of the system; with properly overlapping signals, reinforced by all the ingenious safeguards now available, a degree of security might be attained such as no road with anything like a large business could (or would knowingly) do without.

S. GOODNOW.

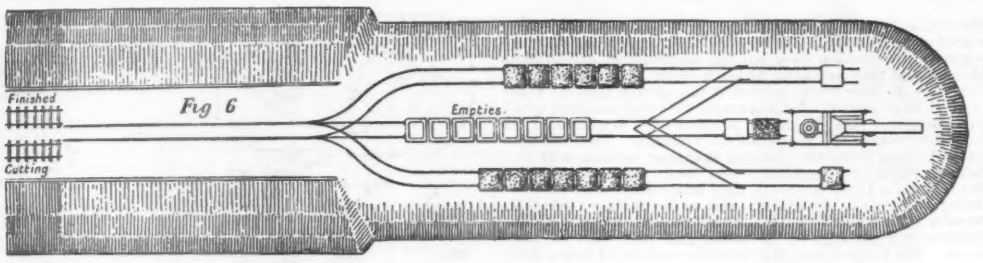


Fig 6

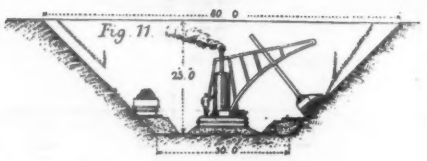


Fig 11.

Fig 8

The Devil's Gate Viaduct Correction.

Phœnixville Bridge Works,
PHŒNIXVILLE, Pa., Dec. 18, 1885.

TO THE EDITOR OF THE RAILROAD GAZETTE.

In your paper of Nov. 27 1885 (page 755), in the article on "Railroad Spirals," Kellogg & Maurice are mentioned as the builders of the iron bridge near Georgetown, the Devil's Gate viaduct. This viaduct was built by Clarke, Reeves & Co., now the Phœnix Bridge Co. The erection of this viaduct was attended by many difficulties. The snow was more than one foot deep in August when we commenced the erection. The workmen employed in the erection were in great part roving miners, who would leave their work whenever they heard of some newly discovered mines. We had to pay $5 per day for such unskilled and unreliable labor.

A. BONZANO,
Vice-President and Chief Engineer Phœnix Bridge Co.

American and English Steam Excavators.

Office of the Industrial Works,
BAY CITY, Mich., Dec. 10, 1885.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The description of the English navvy or excavator, as published in your issue of Nov. 13, 1885, was a matter of interest to us from our connection with this line of manufacture, affording as it did a means of comparison between this and articles of a like tenor before given by English journals, and also because of its enabling us to better judge of the results of American invention and improvement in the same line of work. We also note the communication in reference to this article, from Mr. Howe, of the Osgood Dredge Co., published in the *Railroad Gazette* of Nov. 20. With him we agree that the device described is in mechanism, to a certain extent, that used for many years in this country, and to his statement we would add, that to this same degree it is still the essential feature of many excavators now built here. With him we believe that the achievements of American manufacturers in this line, both as to design and performance, are the equal of their English competitors, and even better. We certainly are able to work in all materials to which such machinery is ever applied, from common sand, gravel and clay to harder substances cemented together and interspersed with stone and bowlders. In our individual experience we have often been forced into seams of slate and shale where blasting should have been the means resorted to for at least loosening the material.

Abroad the steam navvy is employed in railroad work, but in no way to the same extent that it is found useful in important excavations for docks, harbors, canals and drainage systems. With us its use is confined almost entirely to railroads. A knowledge of these various fields, of the differences in railroad construction, and the extent of our own as compared with foreign lines, would at once presume a possibility for designs with the latter which would not be practicable with the former. Such is in fact the case; as, for instance, what American railroad could for a moment entertain a proposition for an excavator whose permanent extreme height was 21 ft. above the track, as with the Dunbar & Ruston machine. With us this class of machinery must be readily portable to cover work at different points of extensive lines, in the lowering of grades and often for the excavation of ballast in cases of emergency; and with tunnels, bridges and overhead crossings, our experience has compelled us to confine ourselves for transportation to a height not exceeding 14½ ft. above tracks. To illustrate this feature of the American machine, we can mention an instance where one machine of our make has been in operation on the same day at two points 75 miles apart, and under these circumstances succeeded in loading in the neighborhood of 50 cars.

There is no question but that the English excavator, with its height gains an advantage because of this in the greater length of crane possible, thus including more surface within the limit of its swing. With such increase in these two dimensions, a greater length of dipper handle is also practicable, and greater reach of dipper secured. All this means ability in certain positions to dig over a much larger surface without moving, and an increase in the length of intervals between movings; in fine, more constant operation and a larger average output.

But the nature of work abroad and their plan of excation determine largely the dimensions of this portion of their machine. With them the "contractor's wagon," as it is termed, a sort of dump car with a capacity of three yards, is used: with us the common flat car in a majority of cases, sometimes with sides and with a varying capacity of from six to nine yards. The former, being small and readily handled with a single horse, permits of a different arrangement of tracks from the latter, which, to a certain extent, must always be moved by locomotives.

The fact then that the English navvy is designed first of all largely for other than railroad use, in the extensive excavations already mentioned and in railway practice for double track work, and the fact that it is used with contractors' wagons instead of our larger and wider flat cars, establishes a length of crane sufficient to cover tracks for these wagons, located on both sides of the machine when in position for operation. The situation is plainly indicated in figs. 6 and 11 of your issue of Nov. 13, while in American practice the position of excavator and attending cars, in a majority of cases, is that noted in fig. 8. We believe no American portable railroad excavator is built with height and reach sufficient to work over two tracks thus located, using the ordinary flat cars for loading. In fact, there is no necessity for this ability, and in most cases it would prove a detriment rather than an advantage.

The point we wish to make is, that the nature and plan of excavation abroad, necessarily different from our own, permits of certain features in the construction and manipulation of this class of machinery which should result in a higher general average of work accomplished, and a corresponding reduction in cost, when compared with our own. In referring to the examples from actual practice in Great Britain following your description of the Dunbar & Ruston excavator, it would be well to state that the contractor is largely the owner of such machinery abroad. He works by the yard, and is pecuniarily interested in reducing the actual cost to its minimum. The results attained, as published by you, presumably the best, are the actual experiences of contractors, and equal to any which we have seen produced in English journals. An examination of the clauses relating to "working expenses" will prove interesting in the matter of labor. Taking the figures which you give, we tabulate them as follows, that they may the better be contrasted with what men competent for similar positions receive in this country. We give prices of labor in both the cases mentioned, the very high and the very low:

ENGLISH TERMS.	RUSTON'S PRICES.			United States.	American terms.
	Highest	Lowest.	Average.		
1 Engine-driver....	$1.80	$1.20	$1.50	$3.25	Engineer.
1 Wheelman.....	1.08	.96	1.02	2.50	Cranesman.
1 Fireman .	.84	.60	.72	1.50	Fireman.
1 Ganger...	2.00	1.08	1.54	2.00	Foreman.
8 Men ...	8.64	5.76	.90	1.10	Laborers.
	.....	.....	$5.68	$10.35	

As in our business it is for our interest to keep the run of engineers and others familiar with the working of our excavator, or steam shovel, as it is now frequently termed, we naturally know very accurately the market price, so to speak, of such positions. The wages which we give are those actually paid by many roads which could be mentioned. Contrasting them, we again see reasons why our foreign competitor should be able to surpass us in the cost of work. That this is not a fact, however, we think can be established.

It has been the custom of many railroads owning steam shovels of our make to furnish us, periodically, with reports giving data concerning their operation. Recently, several such statements have been received, one of which furnishes the details in a most compact form for several months of the present year. The shovel is one built several years ago and has been in constant operation most of the time, summer and winter, up to a recent date. The capacity of its dipper is 1½ yards. The nature of the work performed during the time covered by our statement has been the digging principally of clay, at points interspersed with a grit, and exceedingly hard and tenacious. This material has been transported a distance of from one to two miles and there used in the construction of

Statement showing work performed by steam shovel and cost of same for six months in 1885.

	Repairs shovel, locomotives and cars.		Supplies for shovel.....	Rent locomotives and cars...	Supplies for locomotives.....	Wages engrs., firemen and wipers.	Wages of all other men, including trainmen and men on bank.	Total cost.	No. cars.	Cost per car. Cents.
	Material.	Labor.								
April..... ...	$56 64	$29.22	$229.90	$232.25	$200.75	$174 34	$1,153.28	$2,076.38	3,339	62.18
May.....	145.53	25.31	248.69	234.00	359.48	272.75	1,980.33	3,266.09	6,518	50.10
June...	73.78	27.76	326.18	234.00	335.15	285 85	2,053.33	3,338.05	6,326	52.76
July	104.71	43.47	540.67	236 50	332.55	289 73	2,067.17	3,615.80	6,529	55.38
August..... ..	50.80	74.73	247.00	234.00	260.98	286 58	1,961.93	3,116.02	4,474	69.64
September....	25.68	11.31	165.56	234.00	291.61	199.12	1,463.97	2,391.25	4,955	48.26
Total.....	$457.14	$211.80	$1,760.00	$1,404,75	$1,781.52	$1,508.37	$10,680.01	$17,803.59	32,141	55.38

Material: Exceedingly hard and tenacious clay interspersed with grit at points. Shovel several years old, and has been in nearly constant operation. Capacity of dipper, 1¼ cu. yds. Haul one to two miles, for making a large embankment.

a high embankment. The items of expense enumerated cover the cost of all labor in loading, dynamite where necessary, fuel, oil and waste for shovel, locomotives and cars, rent of one locomotive and several cars, all repairs of same as well as of plough, watchman, labor of engineers, fireman, wipers, conductors, brakemen and men employed at bank after unloading—in fact everything in any way connected with the building of the embankment.

The statement of the actual results of work with this shovel is given in the table herewith.

This table shows a total of 32,141 cars of material handled at a total cost of 55.38 cents per car, which includes, as before stated, all expense of digging, transportation, unloading and the building of embankment. As each car contained seven cubic yards, the total cost per yard was 7.91 cents.

We have not yet said enough, however, to be prepared to make a comparison with the English cost of excavation. For their excavators, the cost given is only the actual expense attending the digging and loading of material upon wagons, and the handling of these wagons for this purpose. *The disposition of material is not included.* Taking the average of several actual examples for labor and fuel, and estimating for contingencies which enter into cost, the Ruston article sets this down at 3 cents per yard for sand or gravel and 4 cents for clay. It will be noticed, however, that these figures are less than those contained in the table which he gives of actual results attained in several kinds of material, and that too by contractors.

Fully understanding the basis of his conclusions, we now summarize the results of our shovel's work, in the instance mentioned, in a manner to correspond, and as follows:

Total of shovel, locomotive and car repairs	$668.94
Total of fuel and supplies of every kind for shovel.	1,760.00
Total of labor for one each, engineer, craneman, fireman, foreman of gang and eight laborers.	3,542.40
	$5,971.34

Total output, 224.987 cubic yards.

Average number of cars loaded daily, 206.

Cost per cubic yard of material handled, 2.6 cents, whereas the lowest cost given by Mr. Ruston for working in any class of material is 3 cents.

We have included repair of locomotives and cars as a part of the actual expense of the shovel's operations, as these items had not been kept distinct from those really belonging to it. The plan of excavation was laid out so that the track carrying the cars to be loaded was of a slightly down grade. In consequence, the shovel could supply these cars as rapidly as wanted, without assistance.

The result given is one attained by a railroad operating its own machine, and as compared with the English report of contractors' work, with the cost of American labor much the highest.

From another statement which we have received, and which is of special interest because of the distance hauled, we would quote as follows:

"Our work this season has been mostly in hard cemented gravel, and our shovel is supposed to have been in operation 10 hours each day, but the interference of passing trains and our being compelled to wait for cars has reduced the time of its actual operation to about 6½ hours daily. We load six cubic yards to the car, and the average cost of this, including all repairs and expenses attending the operation of the shovel, and of labor connected with it, has been 3 cents per cubic yard. With a 10-mile haul from shovel, including all repairs, use of cars and engines, expense of crew, etc., the cost has been 10 cents per cubic yard delivered on road-bed. Same with 20-mile haul, 15 cents per cubic yard, and with 30-mile haul, 20 cents per cubic yard. Have known some 30-mile hauls to cost 75 cents per cubic yard, this, however, depending much upon interruption by trains."

We are confident that shovels which we have constructed for the New York Central system in the East, and for the Atchison, Topeka & Santa Fe system in the West, can show records fully the equal of what has been given.

C. R. WELLS,
Secretary Industrial Works.

Master Mechanics' Association.

The following circular has been issued by Secretary J. H. Setchel from his office in Dunkirk, N. Y.:

DRIVER BRAKES FOR LOCOMOTIVES.

The Driver Brake Committee request an early reply to the following queries, viz.:

1. Are there any circumstances under which you would recommend the application of driver brakes, and if on all classes of engines, viz., passenger, freight and switching?
2. What are the best substances, the best shape and best size for brake-blocks to be used on steel tires?
3. Does the application of drive brakes lessen engine mileage between each tire turning, etc.? If so, to what extent?
4. Does their application lessen mileage between repairs that can be got out of journals, axle-boxes, horn-blocks and wedges, side-rod brasses, etc.?
5. Is any injury done to engine or side rods by applying brake blocks on one side only, and between wheels (wedge type), thus forcing the axles further apart, or is there a practical advantage in gripping each wheel with brake-blocks on both sides (compression type)?
6. Is it advantageous to couple driver, tender and train brakes, so that one handle or valve will apply the whole?
7. Which is the best position for brake-blocks so as to give the greatest power and least interference with the elastic action of the main springs?
8. What percentage of the weight of the drivers is it judicious to utilize for brake resistance in view of the train breaking loose, and the possibility of the front (by the automatic application of the brake) being brought to a stop earlier than the rear portion, thus resulting in a rear pitch-in?
9. Do you recommend the application of steam or other form of power-brake on drivers when the train is not provided with any form of continuous brake; or, in other words, is there any element of danger in having a powerful brake resistance at the front end of the train?
10. As there are several ways of applying brakes through an electric current, should the electric wire be so connected with the source of power that the touching of a button or key by train conductor would give him the opportunity of applying the brakes on the driving and tender wheels, as well as on the car wheels?

Do not confine your answers to the above leading questions, but in addition kindly give any experience, information, statistics or opinions you may have on the general subject of the application of driver brakes to locomotives [either for or against]. On behalf of committee,

H. A. WHITNEY, Intercolonial R'y.
J. DAVIS BARNETT, Grand Trunk R'y.

Replies should be addressed to J. Davis Barnett, Port Hope, Ontario, Canada.

Draw Bridge Interlooking Apparatus.

The Old Colony Railroad between Boston and Fall River is now double tracked with the exception of 2,000 ft. of single track on the approaches and bridge crossing the Taunton river at Somerset. This bridge contains a draw, and the expenses of widening the structure for double track would have been very great. Interlocking switches and signals have therefore been adopted to insure safe working. The bridge and tresslework together are 1,550 ft. long, and of this the draw itself is 185 ft. long. The double track finishes within a short distance of each end of the trestle in a point switch, which is about 700 ft. from the draw. On the opposite tracks, but 300 ft. further from the draw, is the "safety" or "throw off" switch connected to a short length of track, terminating in a grading of sand, 200 or 300 ft. long. Should an engineman disobey his signal, he will run, not into another train or an open draw, but upon a bed of sand, which will speedily pull him up without danger of damage to life or property.

The arrangement of tracks is extremely simple, a double track resolving itself into one at a bridge; a switch to run from one track to another; and a "safety" or "throw off" switch to keep enginemen where they are expected to be. The signals are the Old Colony semaphore pattern, and they are fixed in proper positions to be readily seen by enginemen. The problem is not only to keep two trains from meeting on the single line of track, but when the drawbridge is open to keep trains from entering at either end; and further, when a train has entered at either end, to prevent the draw from being opened.

The mechanism by which these ends are attained is more complex, but not more complicated, than the tracks themselves. At each end of the draw a cabin about 10 ft. square has been erected, in which to inclose the operating levers or interlocking apparatus. Each apparatus consists of six working levers, and both are exactly similar. The levers are as follows, viz.: No. 1, bridge lock lever; No. 2, facing point lock and advance signal lever; No. 3, switch lever; No. 4, facing point lock lever; No. 5, home signal lever; No. 6, distant signal lever. There are two facing point lock levers, one for each switch. Levers 1, 2, 3 and 4 are connected by gas pipe laid on suitable carriers or pulleys fixed every few feet, and run to the bridge lock in one direction, and the switches and facing point locks in the other. Levers 5 and 6 are connected by wire, and run to the home and distant signals.

When the levers are in their home or normal position, the signals are at danger or stop. The switches are set against the draw and the draw is securely locked. The operator is warned of the approach of trains by annunciators, which ring when a train is one mile from the bridge.

To allow a train to pass, the following operation is necessary: First, the switches are set for the train by means of lever No. 3. Second, the switches are locked. Third, the home signal is lowered. Fourth, the distant signal is lowered. Everything is now clear for a train to proceed over the bridge, and while levers are in this position switches cannot be moved or the drawbridge unlocked. Nor is it possible for the operator to change his mind, and by suddenly reversing his levers cause trouble by rapidly unlocking the draw, after a train has passed the distant signal at "all clear;" for, by means of automatic electric locking, the train itself holds its road, and prevents conflicting routes being given until it has passed the danger point. If a train should be brought to a stop at the home signal, its rear is protected by an automatic electric signal, placed sufficiently far away to allow the heaviest train to come to a stop.

To open the draw the following operations are necessary, all levers being presumably in their normal positions. First—The bridge lock lever in each cabin is pulled over. This locks all switches and signals at danger and permits the draw to be unlocked. It at the same time swings the gates across the track, one in each direction, in accordance with the provisions of a law of Massachusetts. Second—The operator unlocks the draw by means of a steel handle lying between the rails, and formed like a key. Third—The operator goes to the centre of the draw, withdraws the massive bolts holding it in position and proceeds to open it. Until the draw is brought back to its shore position, the bolts replaced and the key inserted and turned, nothing on the track can be changed. It must not be supposed that the manipulation of the levers takes a long time. Railroad officers having interlocking machines at large yards and termini say that men frequently throw from 10 to 15 levers per minute.

The interlocking apparatus referred to was designed and put in place by the Union Switch and Signal Company of Pittsburgh, Pa. It went into operation on Dec. 1, inst., and works perfectly, in accordance with the above description.—*Boston Herald.*

The Abt System for Working Steep Inclines.

At the second October meeting of the American Society of Civil Engineers Mr. W. W. Evans read a paper under the above title, giving some interesting historical notes on the general question of working steep inclines, and likewise gave a more particular description of the latest and in some respects probably the best system of rack railroad which has been as yet devised, the Abt system. The most notable feature of the latter, which makes it, so far as yet appears, so great an advance upon others, is the ease with which the transition from working by the rack and running by adhesion in the ordinary way is made. Under it, a train may approach the foot of a rack grade at pretty high speed while running by traction in the usual way and, by the peculiar construction used, the rack engages with the gear wheels certainly and simply, without shock or wear, the engine continuing to work by adhesion as before, but supplemented thereafter by the rack engine. The following is a brief summary of Mr. Evans' paper:

Reference is first made to the various experiments that have been made in the past for the transmission of loaded cars up steep inclines; instancing the English patent of Blenkinsop in 1811, for a rack on the line of railway, with the driving pinion on the locomotive, laid near Leeds in 1812 and which was worked for the transmission of coal for over 20 years on gradients of 1 in 15. This method was not applied, however, to any of the regular railway systems which, in their earlier development, were supposed to be only practicable for locomotives for gradients less than 1 in 100, the steeper inclines being overcome by means of planes with rope traction. In 1847 an application was made of a rack and pinion arrangement at the inclined plane at Madison, Ind., with an average grade of 1 in 17, and a length of 7,040 ft., and with a curve of 800 ft. in length and 1,000 ft. radius. This was worked successfully until 1868, when very heavy locomotive power was adopted depending upon adhesion. (This plane and its arrangements are described in Paper No. 158 of the *Transactions* of the Society, March, 1878. Other inclined planes are described in the *Transactions* for August of the same year.) About 1849, Mr. George Escol Sellers proposed a smooth centre rail, with horizontal friction rollers pressing against it, and the first engines for the Panama Railway were built upon that system; but the construction of that road with much lighter grades than had been expected led to the abandonment of this system. In 1867 Fell applied the same idea to the railway cars at Mont Cenis. In 1866 the Mount Washington Railway was built by Mr. Sylvester Marsh with a centre-rack rail in the form of a wrought-iron ladder. This was finished in 1869, and has been worked with entire success ever since, up to the present time. About the same period Riggenbach proposed to construct the rack rail for the St. Gothard Railway; and in 1871 the Rigi Railroad was opened, with a wrought-iron ladder rail constructed by the same engineer. He also constructed a railway in Switzerland, which was made up partly of rack-rail sections and partly of simple adhesion sections. There have now been constructed about 28 miles of rack railways in Europe, which are all in regular operation. On account of many defects and difficulties in operating the ladder rail upon steep inclines, Mr. Abt has invented a method which consists essentially of a number of racks placed side by side. These are simple bars, side by side, provided with teeth, bolted and connected by metal chairs and bolts, and laid so that the teeth are not at the same location in the contiguous bars, but are arranged so as to permit the simultaneous contact of several teeth of the pinion wheel with different bars of the rack, which produces a smoothness of motion never obtained with the ladder rails; also giving a security against fracture of the teeth, and permitting pinions so much smaller in size that multiple gearing is unnecessary. The pinion wheels are constructed of separate disks, and are so arranged with elastic connection that they have a smooth motion relative to each other, thus counteracting the effects of any slight inaccuracies in manufacture. Motion is obtained by this system which is perfectly smooth and free from blows and irregularities at a speed of 16 miles an hour, and this without the disagreeable noise of the ordinary rack rail. This system is also applicable with great facility to curves of any practicable radius; it can also be cleaned with ease by a device on the locomotive. The crossings and switches are made without difficulty; and transitions from this method to ordinary traction rails, and the reverse, are made practicable and easy by an ingenious perpendicular movement of the first set of rail-bars. The locomotives of this system are made with independent steam cylinders, thus permitting the adhesion drivers to work alone on the ordinary portions of the line, and permitting the rack and pinion to supply the additional traction when on rack-rail systems. This system has been applied to what is called the Hartz Railway, with gradients as high as 1 in 16¼. Another road in Baden is in course of construction, which will be, in its steeper portions laid, with this system, and also another in Bavaria with very steep grades.

It is claimed that this system can, with the best results, be applied to many portions of existing lines, and to the connections of otherwise impracticable points with existing lines.

Saved by a Child.

The crew of a coal train on the Lehigh Valley Railroad had a sensational escape from death at Yatesville, Wednesday. The workings of Fowler's colliery caved in during the night and caused the surface to subside for 200 yards over which the railroad runs. The bottom of the cave-in cannot be seen, and an attempt to fill up the breach was attended with so little success that though 90 car loads of earth were dumped into the hole it appears to be still as deep and wide as ever. Near the spot where the cave-in occurred lived a family named Behony, who during the night were driven in fear from their house to a neighbor's outside the affected area. At an early hour Wednesday morning, little Maggie Behony, aged 10 years, while fetching water, heard a train coming, ran to the track, and by frantically waving her cap, succeeded in stopping the train close to the brink of the cave-in. When the train hands made an investigation and discovered their narrow escape they made the child a handsome reward for her thoughtfulness, and the facts have been reported to headquarters.—*Port Jervis Gazette, Dec.* 18.

RAILROAD GAZETTE

Published Every Friday.

EDITORIAL ANNOUNCEMENTS.

Passes.—*All persons connected with this paper are forbidden to ask for passes under any circumstances, and we will be thankful to have any act of the kind reported to this office.*

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

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THE YEAR.

The year now about to close opened with a very unfavorable condition of industries and traffic. Many factories were closed; many workmen were on short time or out of employment altogether; prices of most commodities were extremely low; those who had business generally complained that it was unprofitable; railroad earnings were falling off seriously, and, while it can hardly be said there was much apprehension of a panic or general financial disaster, there was a great deal of distrust of railroad properties, as was demonstrated by the very low prices of stocks and especially of many bonds.

The year closes with a very decided change in the popular feeling, and considerable change for the better in trade and manufactures. The improvement in confidence is doubtless greater than the improvement in business, but it is probably more important also. The expectation or fear of a further fall in prices is fatal to all enterprises, and especially to anything which requires some time to establish. Since the middle of 1881 this had been having a great effect. At that time the number of projects for new railroads and factories and for the extension of nearly all kinds of business was enormous, there having been for several years up to that time a rapidly growing demand for goods and generally advancing prices, so that profits in most kinds of business were large. The disastrous failure of nearly all kinds of crops in 1881 and the resulting dullness in business of many kinds and reduced railroad earnings, together with the great railroad war of that year, so changed the outlook as to greatly increase the difficulty of realizing these new projects, and great numbers of them never were realized. But a very large number had gone too far to be stopped, and the addition to the productive capacity of factories and similar productive enterprises, and to the mileage of railroads, in the years 1881 and 1882 was enormous, and altogether out of proportion to any possible increase in the demand for products and transportation, even if this had grown as for two or three years previous to 1882, which it did not. No small part of these new enterprises, which in 1880, 1881 and 1882 absorbed a very large part of the capital and labor of the country, particularly the new railroads, were chiefly designed to furnish means for a further increase of productive enterprises—as rails for new railroads, building material for these and for new factories, machinery for new works, and the like. But just as the country had been equipped with the means for increasing still more rapidly its production in these directions, it was found that it was already over-supplied—that a very considerable further increase of population and agriculture was necessary in order to use the existing capacity for producing many articles, for which the only available market is at home. The result has been that comparatively few new enterprises have been set on foot and carried out of late years. Those that were carried out were for the most part set on foot and had absorbed some capital before 1882. In 1885 there was probably a smaller addition to the productive capacity of the country, outside of agriculture, than in any other since 1879—less even than in 1884, when there was very little. The statistics of railroad construction so far collected indicate that the number of miles completed was one-fourth less this year than last, and the smallest since 1878. In some important industries it is doubtful whether there have been additions enough to make good the establishments abandoned during the year, and in not a few the productive capacity certainly greatly exceeds the present consumption, though that has increased considerably since summer. Thus the capacity of the iron furnaces in blast Dec. 1 was only 84,966 tons weekly, while the capacity of those out of blast was 88,937 tons. The only direction in which there seems to have been considerable activity in new construction last year was in the building of houses, which in several large cities was about equal to that in previous more generally prosperous years.

For many railroads, especially for those east of Chicago and St. Louis and north of the Ohio and the Potomac, and most of all for the eastern trunk lines, the past year was made much more unfavorable than the natural conditions would have made it by the war of rates, which resulted in what we may call an unconditional surrender of two lines, and was doubtless waged for that purpose; the New York, West Shore & Buffalo, having been worked for a year at a cost greatly exceeding its gross earnings, becoming the vassal of the New York Central Company, while the incomplete South Pennsylvania road, on which only a few millions had been expended, was surrendered to the Pennsylvania. This struggle and its results have more than a temporary importance, as they indicate that it will be extraordinarily difficult, if not impossible, to introduce a new trunk line from the seaboard to the West, unless it is owned by a strong system of existing railroads—as by a great western company or syndicate of companies; that to build such a line there is needed not only the capital which it will cost for construction, which capitalists will hardly be ready to provide unless payment is guaranteed by corporations with a large income and good credit, but also a large fund to pay interest while it is being established, since otherwise its competitors might compel it to work without profit, as the West Shore had to for the two years of its existence, and especially for the last year. Generally it may be said that the experience of this year has demonstrated the extreme danger of building a railroad dependent for income enough to pay its fixed charges on traffic which is within the reach of other railroads which do not wholly depend on that traffic—that no railroad can safely be undertaken which does not possess considerable independent sources of revenue. It is too much to expect that this experience will prevent an unnecessary duplication of railroads hereafter, but it will make very much less probable the duplication of the costliest lines, and will strengthen the tendency, already marked, to leave to existing railroad companies the construction of new railroads generally throughout the country, as being best able to judge when and where a new railroad will pay, and especially as being able to get a much greater profit out of one than any new company owning no other railroad.

The good crops in 1884 of everything except cotton promised to do much to restore prosperity to the country and especially to the railroads. This promise was not realized to the extent expected. There was, in fact, a somewhat larger grain movement than the year before in this country during the crop year ending with July last, but it was very small in comparison with the increase of hundreds of millions of bushels in the crops, and the exports were less than in most years since 1877. Moreover, the very low price of wheat, the chief grain export, made the income of wheat-growers very small, and for them nullified the advantages of the abundant crop.

Cotton, which again is our chief export, was not a good crop in 1884, and this helped to keep down railroad earnings and the national income. Thus there was no counterbalancing gain from agriculture to set against the bad returns from other industries.

During the 12 months ending with December, 1884, 84 railroads reporting showed a decrease from $7,149 to $6,532, or 8¼ per cent. in their average earnings per mile. During the first eight months of this year the downward course of earnings continued; 85 railroads down to the end of August having an aggregate decrease of more than $9,000,000 in their total earnings, and a decrease from $4,105 to $3,847 (6¼ per cent.) in their average earnings per mile. Since August the decline has been arrested; in October earnings per mile were as large as last year, and total earnings somewhat larger, and in November, so far as reported, there is an important increase over last year, though not over 1883. There are also other signs that the country has seen the worst of its industrial depression, in a greater demand for many manufactured goods, more general employment of labor, and higher prices for many commodities. The change in the disposition of capitalists, however, is much greater than in anything else, and likely to have more important effects than anything else that has occurred. As we said in the beginning, the fear that prices would fall still lower was stifling all enterprise at the beginning of this year. At that time many railroad securities were selling at prices which were absurdly low if no future disaster were expected. The first sign of some restoration of confidence appeared about the month of May, in purchases of low-priced bonds sufficient to begin an advance in prices which has continued until now. A great impulse was given to this recovery of confidence by the arrangement made public in July, by which the New York Central acquired the West Shore and the Pennsylvania the South Pennsylvania road. This was accepted by investors as an assurance that the trunk line traffic would be made profitable again, but the effect on the market and the disposition of investors was much greater than was justified by that fact alone. It brought about a general conviction that we had seen the worst of the bad times and that one might buy property without the probability of its falling in price within a few weeks. There were then a great many shares and bonds which were and long had been yielding a return which made them very cheap if they were safe. The public suddenly decided that they were safe, and began buying at a rate which brought up the prices in a short time very much above what they had been for several months previous to July.

It is probable that this great buying movement has been carried much further than was due to the facts in the industrial situation, and is due largely to a vivid recollection of what took place in the latter part of 1879 and in 1880, when, after years of extreme depression, securities advanced enormously in price, and fortunes were made out of many which had been esteemed as worthless. Ever since prices of securities fell, people have been looking for a turn in the tide to make purchases of securities in the hope that they would advance 20 to 50 per cent. or more, as after 1878, when a change in the industrial condition enormously increased the profits of many railroads. The effect of this disposition on the part of investors has been greatly to hasten the rise of prices. We give elsewhere abundant statistics of the traffic situation. There is nothing in them to indicate a great increase in railroad profits in the coming year, or rather the next half-year, which is as far as we can see ahead though there is much to indicate that they will be decidedly larger than the extremely unsatisfactory ones or most of this year of the twelve months ending with August last. In fact, the recovery from the bad times of 1874 and subsequent years actually began with the good harvest of 1877, though it was not generally recognized until the last half of 1879. Then, however, people were not on the watch for the first sign of an upward turn as a signal to buy stocks and bonds as they have been this year, and large profits had actually begun before prices rose to high figures. The good times of 1880 came after three successive bountiful harvests and when there had been an enormous increase in our chief exports. Now exports are, as they have been since the first half of 1881, unusually light, and one of the chief crops is exceptionally poor. On the other hand, the recent depression was never so severe as that after the panic of 1873, and it is reasonable to suppose that we shall recover from it more quickly. The development of other industries has been so much more rapid than the growth of agriculture and the population has increased so greatly that the crops and the prices of grain and cotton and the exports are relatively less important than they were six or eight years ago.

While expectations of great railroad profits are likely to be disappointed, advances in prices based upon the conviction that there will be no further reduction of profits are likely to be justified. The rate of interest in this country has fallen greatly, and safe securities yielding 6, 5 or even 4 per cent. on their cost are not easy to get outside of railroad investments. When there seemed to be danger that a stock paying 6 per cent.

would have to drop to 4 or 2 or pass entirely, and perhaps for years or forever, par was a high price for it; when that danger is removed, or the public thinks it is, a great deal more than par is only a reasonable price for it.

The absorption of the West Shore by the New York Central was the signal for a reëstablishment of the trunk-line pool on a new basis, intended to insure better the maintenance of rates and the continued cooperation of the railroads concerned. There have been, perhaps, the usual number of wasteful contests in other sections of the country in 1885, though, we should say, hardly as much has been lost by them as in 1884—more in the South, but less in the Northwest and Far West. The new railroads built so plentifully from 1880 to 1883 have been finding their place, several bankrupt companies have been reorganized; the disposition to coöperate — at least attempt to coöperate—where there is competition for traffic, has become almost universal, in spite of very imperfect success in many cases, as is likely to be the case with agreements which cannot be enforced by law.

The great poverty of many railroads has prevented the rapid introduction of safety appliances, but great progress has been made, nevertheless, for the conviction has spread that there is pressing need for improvements of this kind, and it now seems only a question of time when the use of safety couplings will be general, of continuous freight train brakes common, and when there will be a great extension of the block system and interlocking apparatus. In these and other improvements of old railroads there is a great field for work in this country, and they are likely to absorb much of the skill, labor and capital which in some previous years have gone into enormous railroad extensions.

As regards these latter, there will probably be many more miles built in 1886 than in 1885, but we do not look for what would be called in this country a large addition to our mileage, and so far we see no signs of it, as there certainly is no need of it. There are now, as always, numerous projects, but it is not easy to get capital for any which does not have the guarantee of an old railroad company which can offer something more than the road built with the borrowed money as a security for the payment of interest and principal.

Thus, while there seems no reason to expect a "boom" like that in 1880, a continuation of the improvement of business which began three months ago seems reasonably to be expected. A good harvest next summer and a good demand for it may still further improve the situation. So, and much more for the time, may great activity in railroad construction make good business, soon to be followed, however, by a relapse which might be worse than anything we have suffered since 1881.

TRAFFIC STATISTICS.

Of the enormous number of facts affecting railroad traffic and earnings and the general condition of industry in this country, a great many are inaccessible. We do not know the production of industries which, in the aggregate, perhaps employ and support more than half the population. We have, however, knowledge of some of the most significant facts, of the production of some industries on which others largely depend, and a comparison of these for successive years helps greatly to an understanding of the industrial situation, and of the probable course of the production and traffic on which railroads depend for their earnings and profits. As at the close of previous years, we present the more important of these statistics below:

The population of the United States, July 1, assuming the yearly increase to have been 2 per cent. of the previous year's population, plus the immigration of the year (which almost exactly accounts for the increase from 1870 to 1880), has been for seven years:

Year.	Number.	Year.	Number.
1879	48,679,000	1883	55,330,000
1880	50,156,000	1884	56,955,000
1881	51,828,000	1885	58,493,000
1882	53,654,000		

Thus the additions to the total population in successive years ending June 30 have been:

1880.	1881.	1882.	1883.	1884.	1885.
1,477,000	1,672,000	1,825,000	1,676,000	1,625,000	1,538,000

The addition to the population was thus less last year than in any other since 1879–80, and there has been a steady decrease in the number added yearly since 1881–82. This is due to the decrease in the numbers of immigrants, which have been:

1880.	1881.	1882.	1883.	1884	1885.
457,277	669,431	788,992	603,322	518,592	399,800

The decrease in immigration is good evidence that the market for labor or the opportunities for poor men are not so good as they were a few years ago, especially as it is known that there has been no improvement in Europe meanwhile.

Since June there has been some further falling-off in immigration compared with previous years.

In all studies of the business situation, population is of prime importance, more so in this country than in some others, as the market for the products of many of our industries is among our own population exclusively. The rate of increase, which was 3.52 per cent. in 1881–82, was but 2.7 per cent. last year.

The industries which produce much more than the national consumption are agriculture, mining of precious metals, and petroleum. If these increase much faster than the population, there may still be a market for their products. Concerning agriculture, the most important statistics are those of acreage under cultivation, which are estimated for the chief crops by the Department of Agriculture, as follows, for grain of all kinds and cotton:

Year.	Grain.	Cotton.	Total.
1873	77,820,000	10,806,000	88,626,000
1876	103,312,000	11,641,000	114,953,000
1879	118,665,000	14,388,000	133,053,000
1880	120,926,000	16,120,000	137,046,000
1881	123,388,000	16,851,000	140,239,000
1882	125,721,000	16,276,000	141,997,000
1883	129,676,000	16,778,000	146,454,000
1884	135,082,000	17,449,000	152,531,000
1885	137,658,000	18,409,000	156,067,000

These seem to us the most important of the national statistics of industries and commerce, and it is to be regretted that they are not more accurately collected. The figures for grain area given by the early reports of the Department, and which we published at this time last year, made it 133,940,000 acres, instead of 135,082,000 in the final estimate—a very important difference, of significance to all industries in the country. This year there may be an equal difference. We notice that while the Department last June estimated the acres of wheat in Dakota to be 1,586,400, the census recently taken by the territorial authorities (but likely to err by exaggeration rather than in the other direction) makes the number about 2,120,000, or *one-third* more than the Department's estimate. It is peculiarly difficult to get correct information from a new and rapidly growing territory, and errors in the aggregate are doubtless nothing like this; but we hesitate to accept a statement which makes the acreage of grain increase 4.2 per cent. from 1883 to 1884, and only 1.9 per cent. from 1884 to 1885. The latter is less than the rate of growth in population, which was 2.7 per cent. The increase in cotton acreage meanwhile is given as 5½ per cent.

The percentage of increase in acreage in different periods has been:

	Grain.	Cotton.	Total.
1873 to 1876	32.6	7.6	29.7
1876 to 1879	14.9	23.7	15.8
1879 to 1882	6.0	13.1	6.7
1882 to 1885	8.6	13.1	9.9

It is particularly to be noted that the large increases in grain acreage have been in dull times, and seem to have brought—at least preceded—good times, though they were a long time at it after 1873, when it was not until the grain acreage had been increased one-half and the cotton acreage 40 per cent. that business generally revived greatly. During the most prosperous years, 1879 to 1882, the increase in grain acreage was but 6 per cent. (while the population increased more than 10 per cent. In the last three-year period of dull business the increase has been 8.6 per cent. in grain and the same in cotton as in the 1879–82 period; it is too early to say that the more rapid growth of farm industries has brought prosperity, but certainly the situation has improved, as it did really after the crop of 1877, though not so much as to be universally recognized at that time.

The number of acres of grain and cotton per 1,000 inhabitants has been:

1879.	1880.	1881.	1882.	1883.	1884.	1885.
2,730	2,733	2,706	2,643	2,647	2,676	2,668

Thus the acreage (as reported) did not increase quite so fast as the population last year, yet remains very nearly what it was in 1881. But per individual the acres cultivated were 2.4 per cent. less last year than in 1879 or 1880.

The production of grain of all kinds has been in *millions* of bushels:

1879.	1880.	1881.	1882.	1883.	1884.	1885.
2,686	2,704	2,034	2,688	2,622	2,971	2,984

These figures are somewhat deceptive, for the changes in the different kinds of grains have been great. Thus there appears to be an increase over last year of 13 millions (nearly ½ per cent.) in bushels of grain of all kinds; but this is the result of an *increase* of 16½ millions of corn and 16½ millions of oats, against a *decrease* of 156 millions of wheat and 5 millions of rye—a great decrease in the grains of highest price. At current Chicago prices, the increase in corn and oats would be worth less than $69,000,000, while the decrease in wheat and rye would be worth more than $133,000,000.

The production of grain per inhabitant has been, in bushels:

1879.	1880.	1881.	1882.	1883.	1884.	1885.
55.1	53.9	39.2	50.1	47.4	52.1	51.0

The average of the seven years is 49.8 bushels, so that this year is above the average.

The production of cotton, in *millions* of pounds (accepting *Bradstreet's* estimate for this year) has been:

1879.	1880.	1881.	1882.	1883.	1884.	1885.
2,772.4	3,201.5	2,585.7	3,430.5	2,759.0	2,728·0	3,036.3

Thus a production this year 11 per cent. more than last year or the year before is indicated, but less than in 1880 and 1882.

The production *per inhabitant* has been, in pounds:

1879.	1880.	1881.	1882.	1883.	1884.	1885.
56.9	63.8	49.9	64.0	49.9	47.9	51.9

Thus, though the acreage of cotton has grown faster than that of grain, the production has, nevertheless, not kept pace with the population, the production per head being less than in 1879, 1880 and 1882. Just about as many pounds of cotton as bushels of grain are produced.

The movement of these crops is traced below. The receipts of grain, including flour, at the eight Northwestern markets from the end of July to the middle of December have been, in *millions* of bushels:

1879.	1880.	1881.	1882.	1883.	1884.	1885.
134.0	157.7	121.7	128.1	100.0	102.0	131.8

while the receipts of the same at the Atlantic ports since August have been:

1879.	1880.	1881.	1882.	1883.	1884.	1885.
122.4	120.9	82.5	90.8	90.9	90.6	82.4

This indicates the course of traffic since harvest. We see that the receipts of the Northwestern markets this year were more than in 1881 and 1882, but less than in the other years, and 18½ per cent. less than last year, when they were largest. The Atlantic receipts were less this year than in any other of the six, though nearly the same as in 1881. They were only 9 per cent. less than in 1882, 1883 or 1884, but were 31 per cent. less than in 1880, and 32⅔ per cent. less than in 1879.

The *exports* of grain of all kinds and flour, reduced to bushels, for the 11 months ending with November and the five months then ending have been, in *millions* of bushels:

	1881.	1882.	1883.	1884.	1885.
11 months to Nov. 30.	211.7	144.8	164.6	146.6	154.2
5 " " ...	94.7	87.6	77.8	74.6	55.0

For the 11 months, the exports were more than last year or in 1882, and but 6 per cent. less than in 1883, though 27 per cent. less than in 1881; but for the last five months the exports this year have been 26 per cent. less than last year, and 37 per cent. less than in 1882, as well as 43 per cent. less than in 1881.

The value of the total grain and flour exports for the eleven and for the five months ending with November has been:

Year.	11 months.	5 months.	Year.	11 months.	5 months.
1880	$257,310,616	$134,953,931	1883	$159,739,456	$74,590,521
1881	210,318,432	98,337,515	1884	133,454,801	65,338,966
1882	165,501,075	100,734,766	1885	119,639,121	42,880,503

For the 11 months the value of these exports was 10 per cent. less than last year, 25 per cent. less than in 1883, and not half as great as in 1880. For the five months the decrease from last year is more than one-third, from 1881 and 1882 more than one-half, and from 1880 more than two-thirds. Evidently, then, we are not getting rich from our grain exports, which had much to do with the prosperity in 1879 and following years. The values of breadstuffs exports then grew as follows, the figures being for the fiscal years ending June 30, in *millions* of dollars:

Year ending June 30.								
1873.	1874.	1875.	1876.	1877.	1878.	1879.	1880.	1881.
97.2	159.5	109.7	129.0	115 7	178.3	207.1	283.6	267.4

The exports never reached $100,000,000 until 1874. It will be noted that the increase was enormous and very rapid after 1876–77. We are now nearly down to the figures of that year.

The value of the breadstuffs exports per 1,000 inhabitants for the 11 months has been:

1880.	1881.	1882.	1883.	1884.	1885.
$5,130	$4,058	$3,086	$2,887	$2,343	$2,045

Thus the exports per inhabitant this year were three-fifths less than in 1880, half as great as in 1881, a third less than in 1882, 30 per cent. less than in 1883, and one-eighth less than last year.

The receipts of cotton at the seaboard since August, nearly all being of the new crop, have been, in *thousands of bales:*

1880.	1881.	1882.	1883.	1884.	1885.
3,527.7	3,032.5	3,209.5	3,214.7	3,329.5	3,154.2

As the crop this year is certainly very much larger than last year or the year before, there must remain an unusually large amount yet to be carried.

The number of hogs packed in the year ending with October have been, in *thousands:*

1877.	1878.	1879.	1880.	1881.	1882.	1883.	1884.	1885.
7,644	9,842	11,532	12,274	11,723	8,950	9,903	9,461	11,314

The great increase in grain production and exports culminating in 1880 was accompanied by a similar great increase in the packing of hogs and the exports of provisions. And when grain exports fell off greatly

after 1881, so did hog packing and provision exports; but in the last year there has been a great recovery in packing, and some in provision exports, but not in grain exports.

The exports of pork products in *millions* of pounds have been for the eleven months ending with November:

1877.	1878.	1879.	1880.	1881.	1882.	1883.	1884.	1885.
839.1	1,006.1	1,063.5	1,178.6	926.0	560.9	681.3	529.2	709.5

The value of the provision exports, including beef and tallow, butter and cheese, as well as pork products, have been for the 11 months:

1881.	1882.	1883.	1884.	1885.
$120,345,092	$84,863,001	$103,382,237	$85,215,441	$85,235,947

The values of these exports, together with live stock and some other products of animals, in successive fiscal years (ending June 30) till they reached their maximum were, in *millions* of dollars:

Year to June 30.								
1873.	1874.	1875.	1876.	1877.	1878.	1879.	1880.	1881
99.8	99.7	104.3	113 9	140.6	145.6	149.7	161 4	184.4.

These have declined since, like the value of grain exports, to 146 millions in 1881–82, 120 in 1883, 135 in 1884 and 122 millions in 1885. There is, therefore, no such growth in these exports as preceded the good times about 1880.

The best of all the statistics of traffic, throwing light on the freight movement nearly all over the country, are those giving the tonnage over the trunk lines. The number of tons of east-bound freight carried by them from their western termini, for the 11 months ending with November, has been:

1881.	1882.	1883.	1884.	1885.
9,614,394	8,863,470	9,320,684	8,134,572	8,883,660

Extremely low rates prevailed on this traffic this year nearly all the time, resulting in a great diversion of traffic from the canal; this was the case for a shorter time last year, and very much less in previous years, but the Lackawanna for the last three years and the West Shore for the last two have carried a considerable quantity (not nearly so much as the other roads) which is not included, and it is possible that the total eastward *rail* movement was as great last year as in any other, but not the total freight movement.

The west-bound movement of through freight from the four seaboard cities over the trunk lines, *including* the Lackawanna and the West Shore (except the Lackawanna in 1883), has been:

Year.	Tons	Year.	Tons.
1879	1,316.911	1883	1,768,608
1880	1,738,566	1884	1,803,524
1881	1,959.652	1885	1,907,365
1882	2,137,008		

Thus these trunk-line shipments to the West, which include the larger part of the consumption of imported merchandise of the country, were nearly 6 per cent. more this year than last, and 8 per cent. more than in 1883, and were exceeded only in 1881 and 1882, but the proportion of the total shipments taken by the trunk lines has been much affected by changes in rates. A reduction of about one third in the rates in August, 1881, was followed by a very great increase in the shipments; a further decrease at the beginning of 1882 by a still greater increase; this year a reduction of the rate in January like that of August, 1882, was not followed by an increase, the shipments for the five months ending with May having been:

1880.	1881.	1882.	1883.	1884.	1885.
803,438	773,621	1,138,472	767,302	836,154	793,014

so that in spite of the decrease in rates there was a decrease in shipments of 5 per cent. compared with last year.

A further large reduction June 1 to about the rates of the first half of 1882 was followed by some increase in shipments in June and July and in August, but nothing like the increase in 1882, amounting, for the three months, to 38,730 tons, or 8 per cent., while in 1882, during the first three months of the corresponding rate, there was an increase in shipments of 159,600 tons.

It was not till September that a revival of business greatly aided to increase shipments, and that was the last month of the extremely low rates; but after the advance (rates remaining about 30 per cent. less than last year till Nov. 18) there was still a large gain, the shipments in each of the fall months having been:

	1880.	1881.	1882.	1883.	1884.	1885.
Sept	176,007	223,308	213,469	182,852	187,522	226,273
Oct	158,016	237,086	218,602	178,901	158,637	203,206
Nov	144,142	191,691	141,454	134,516	128,599	154,738
3 months	478,165	652,085	573,525	496,269	474,758	584,217

The September shipments were doubtless greatly increased by the expectation of an advance in rates, but also greatly by a decided improvement in trade. In October and for 17 days of November the rates were nearly the same as in October, 1882, but the advance made Nov. 1 in 1882 was not made till Nov. 18 this year.

We find in each of the fall months that the shipments were larger this year than any other except 1881, and for the entire three months they were 23 per cent. more than last year, and 18 per cent. more than in 1883, and were 2 per cent. more than in 1882. They were, however, 10½ per cent. less than in 1881, when rates probably were on the average rather higher than this year. This increase in traffic during the fall months is the most favorable feature of the business situation—the best evidence of a decided revival of trade. It was only in small part due to the low rates, for rates were still lower in the three summer months, and then the increase in shipments, as we have seen, was but 38,730 tons, while in the fall months it was 109,459 tons.

The shipments of anthracite coal from the mines for the 11 months ending with November and also for the four months then ending, have been for nine years, in tons:

Year.	11 months.	4 months.	Year.	11 months.	4 months.
1877	18,821,378	7,312,098	1882	27,085,442	11,767,536
1878	16,152,525	6,654,088	1883	29,463,065	12,972,468
1879	24,469 939	10,570,277	1884	28,325,931	12,325,112
1880	21,942,560	10,415,280	1885	29,302,597	13,162,908
1881	26,100,763	11,784,324			

Thus the shipments for the eleven months this year were very nearly as large as ever before and for the four months considerably larger than ever before.

Receipts of lumber at Chicago for seven successive years have been, in *thousands* of feet:

Year.	M. ft.	Year.	M. ft.
1877	1,066,452	1882	2,117,545
1878	1,180,566	1883	1,909,910
1879	1,469,878	1884	1,830,000
1880	1,561.779	1885	1,765,000
1881	1,878,922		

Down to 1878 the business had been nearly stationary for ten years. The table shows the whole rise, and the recent decline, which makes the receipts this year 3 per cent. less than last year and 17 per cent. less than in 1882, but much larger than in any year previous to 1881.

The miles of railroad completed in the United States during each of the last nine years have been:

1878	1879.	1880.	1881.	1882.	1883.	1884.	1885.
2,916	4,570	7,174	9,789	11,596	6,753	3,977	3,050

The mileage for this year is partly estimated, and may be considerably in error, but there is no doubt it is much less than in any year since 1878, before railroad construction had begun to revive. The construction this year makes an addition of about 2½ per cent. to the mileage of the country. The railroad mileage completed at the close of each of the last eight years has been:

1879.	1880.	1881.	1882.	1883	1884.	1885.
85,497	93,454	103,242	114,838	121,592	125,379	128,430

The number of inhabitants, of acres in grain and cotton, of bushels of grain and bales of cotton produced, per mile of railroad, have been as follows for the last seven years, in all cases taking the mileage and population at the close of the year and the crops, etc., of the previous summer:

	Population.	Acres.	Bu. grain.	Bales cotton.
1879	581	1,565	31.600	67.73
1880	545	1,466	28,932	70.53
1881	509	1,359	19.804	52.65
1882	473	1.236	23.405	60.18
1883	466	1,204	21,563	47.00
1884	458	1,216	23 690	45.44
1885	461	1.216	23,241	50.41

It is encouraging to see that there was no decline in most of these last year, but it is well to remember that compared with 1879 there are now one-fifth less people and acres of grain and cotton, and one-fourth less bushels of corn and bales of cotton to support each mile of railroad.

STEAM EXCAVATORS AND BALLAST TRAINS.

The temperate and detailed presentation, in another column, of the steam excavator question, and of comparative results with English and American excavators, is one well worthy of careful perusal, and will, we trust, receive it. The field for the use of such excavators is very large, and as yet very imperfectly filled; for many roads are sadly in need of more ballast, and would have it if they were provided with an excavator to load and a ballast-plow to unload cars, which have not taken the necessary first step in that direction.

In publishing the English paper on excavator work to which our correspondent refers,* we were not without hope that it might call out some similar statements of American practice, and we trust it may call out more, if they deal, as does the letter published this week, with definite facts and figures, and not with vague assertions and claims. The steam excavator was invented and first used in this country, and it would be a rather unusual circumstance if a device invented by Americans should fail to receive here its highest development.

It was a saying of the late Charles Collins that "two feet of ditch is worth one foot of ballast," and this has a foundation of truth, at least, as was shown by the results of free ditching on the Lake Shore road. It may plausibly be claimed that when a road is neither well ditched nor well ballasted a limited amount of money will accomplish more good if spent on ditching than on ballasting, and there is a certain absurdity in putting on a thick coat of clean ballast in a cut where the ditching is so imperfect that there can hardly be said to be any. Nevertheless, more and better ballast is a crying need on many lines of considerable traffic, if not on most lines not of the first rank, and if it were more generally realized how cheaply ballast can be supplied by improved modern appliances and how greatly it would decrease wear and tear and maintenance expenses, both of track and of rolling stock, as well as sometimes increase by a car or two the length of trains, there would not be so many roads as there are practicing an expensive economy in this item.

One reason why ballasting is often so costly, even with all the advantages of steam-shovels and unloading plows, is referred to in the closing lines of our correspondent's letter, and deserves the attentive consideration of superintendents and managers; for it reveals an abuse (or what is often such) which can only be corrected by them. The closing quotation gives as the cost of work with steam excavators and gravel trains:

All expenses connected with loading				3 cts.	per cu. yd.
Loading and delivering on roadbed, 10-mile haul.	10	"	"	"	
"	"	"	20	"	15 " " "
"	"	"	30	"	20 " " "

The significant addition is made, however:

"Have known some 30-mile hauls to cost 75 cents per cubic yard, this, however, depending much upon *interruption by trains.*"

This latter statement is an exaggerated example of the abuse we speak of, but the same abuse is revealed to some extent even in the smaller figures, and the abuse is this: The ballast train, in disregard of all considerations of economy, and without the excuse of any real necessity, is all but universally treated as a kind of outcast or Pariah among trains. It has, both literally and figuratively, no rights which any white man in the service is bound to respect. The extent of its privileges is embodied in the stereotyped formula that it "has permission" to "work between A and B, *keeping out of the way of all regular trains.*" What that means, on a road doing any considerable business, with all the necessary delays for clearing the track "ten minutes ahead of all regular trains' time," and for waiting for them to arrive when late is well enough known: It means an enormous proportion of lost time per day, doubling and trebling the cost of delivering ballast on the track, not only in many but in most cases.

Nevertheless, this limitation of privileges is natural enough and well enough as a matter of permanent rule. A ballast train cannot be anything else than an irregular train, and cannot safely be given any rights whatever, *except by special order;* but therein lies the difficulty. Trains are, as a matter of fact, almost all run by special order, and when giving such order, it rests entirely with the discretion of the dispatcher, within wide limits, to favor one train or another as he sees fit. This discretion, however, is rarely exercised to prevent delays of ballast trains, which cost money, rather than delays of regular trains which do not directly cost money, or not nearly so much as delays of ballast trains, but the latter get from the dispatcher, improperly and unwisely, much the same kind of treatment that it has, necessarily and properly, in the printed rules and time tables.

Now a regular freight train is earning perhaps $1.50 per mile run and costing $1, but it will earn no less (barring a slight loss of fuel) and cost no more, for being a quarter or half an hour more or less upon its trips. On the other hand, the total expenses for running a steam excavator with perhaps three or four engines at work to handle the cars are from $100 to $150 per day. A delay to any one of these trains is to a considerable extent a delay to all and to the excavator as well, and a delay of three hours per day to these trains (which is about a minimum) means the loss of $1,200 to $1,500 per month.

Under these circumstances what ought to be done, if true economy is to be considered, is to prepare something like a regular schedule for the movement of these trains, from day to day and from week to week, for the use of the dispatcher; to provide as good facilities as possible for communicating orders to them, and to require that, whenever and wherever it is possible without too great delay, the gravel trains shall be favored at the expense of the ordinary freight trains.

What actually is done is that the gravel trains get no favors at all. The autocrat of the dispatcher's office very naturally has his attention most closely fixed on his regular work of moving the regular trains over the road; and because it is plainly necessary that the efficient movement of the traffic *as a whole* should not be interrupted by ballasting work, he is very apt to draw the quite unsound deduction that each particular

* Dunbar & Ruston's Steam Excavator.—*Railroad Gazette*, Nov. 13, 1885.

freight train must go over the road as if there were no ballast trains at work, and the onus must be thrown wholly upon the latter of keeping out of the way. The natural tendency of every man is to magnify his own office and to perform his duties in a routine way, and the loss is one the full amount of which is not likely to be realized by those most directly responsible for it, and which does not appear upon the books in any such form as to make its origin clear after it has been incurred, in a manner to attract attention to it.

In some cases this is not so, but in more cases it is, and it is a promising direction for any managing officer to look for a further economy; for, supposing the delays to gravel trains to have been reduced to a minimum, there is, perhaps, no maintenance expenditure which would be so directly profitable on many thousands of miles of road as to procure a steam excavator and ballast plows, and keep two or three trains at work for a good part of each season increasing the depth of ballast. Half a cubic yard per cross-tie will raise the track some 8 in., and on many roads at least, where the road-bed is wet and the haul not too great, this would not be so very bad an investment, simply as a preservative of cross-ties.

An additional economy for this kind of work on many lines, and one deserving of more frequent use, is the hauling of side dump cars loaded with ballast on regular freight trains, especially way freight, whenever, as is frequently the case, 8 or 10 additional cars can be hauled over a portion of the division as well as not, owing to more favorable gradients. Many types of cars suitable for this purpose exist, which are readily dumped by one man, and wherever traffic is not very dense, the economy of using them is great, since the cost of haul is almost eliminated.

The very fatal accident near Atlanta, of which mention was made last week, is another instance added to the many which have preceded it of the danger arising from numerous openings into the locomotive boiler. In this case the locomotive of the rear train ran partly through the rear passenger car of the preceding train, and while some injury to persons would probably have been caused by the shock of the collision and the destruction of the car, as a matter of fact, most of the casualties were caused by the escaping steam from the locomotive. It does not appear from the account that the locomotive was very badly injured, and in all probability, the steam from the boiler made its way out chiefly by the openings left by the breaking off of the various boiler fittings. It is probable that in this case most of the death and suffering would have been spared had the locomotive been fitted with one of the simple appliances for reducing the number of holes in the boiler, and for closing the remaining ones in case of accident, to which reference has from time to time been made in our columns. That these appliances have not been more widely adopted is not altogether to the credit of our master mechanics; and it is to be hoped that the Austell accident, with its record of lives lost and terrible human suffering, may again recall the attention of those directly concerned to the expediency of making this improvement in locomotive construction.

The report of the New York Central & Hudson River Railroad, an abstract of which we publish this week, enables us to see what was the effect of the great reduction in passenger rates on this road. For all but a small part of the fiscal year local passengers were carried over the most important lines of this company at 1 cent per mile, against 2 cents in previous years, and through fares were also much lower than the previous year. The result was an increase of 13 per cent. in passenger mileage, the number of through passengers increasing but 3¾ per cent. and of way passengers 15½ per cent It seems incredible that so great a reduction in fares should be followed by so small an increase in travel; and, in fact, doubtless this was not the whole effect, for about 200 miles of the West Shore road, close alongside, were first opened in this last year, and to measure the full effect of the rate we should have the travel on both roads in both years.

The decrease in passenger earnings was less than 18 per cent., the decrease in the *average* fare having been from 1.942 to 1.419 cents per mile. An almost total cessation of immigrant travel tended to keep up the average rate. This is the first time there has been so large a decrease in the rates for the local travel of a long line, and the effect is therefore interesting to observe. The average rate is so much above a cent a mile that it is evident that the latter did not apply to a large part of the travel. It is noticeable that the increase of 13 per cent. in passenger traffic was conducted with a decrease of 3½ per cent. in passenger train mileage, the average train load having increased from 60 to 70.

Freight rates were also lower last year than before, the average on this road falling 0.834 to 0.688 cent per ton per mile—remaining higher than the average on some other railroads in previous years. The freight traffic increased 8½ per cent., and the three-fifths of the increase was in through freight east, mostly in grain and provisions. The freight traffic remains much less than for several years previous to 1884.

The decrease in freight earnings was larger in amount than the decrease in passenger earnings, and at the rate of 10½ per cent.

More than a million of the great decrease of $3,719,228 in the reported total earnings is due to a change in book-keeping, the receipts and expenses for car mileage having been given as earnings and expenses respectively heretofore, while this year only the difference (debit balance) is given, in expenses, as has always been done by most other railroads. This also must account for a large part of the decrease of $1,530,000 in working expenses, but just how much cannot be ascertained from the abstract now published.

An important railroad extension has just been opened to traffic in South Africa, the government line being now completed from Cape Town to the great diamond mining town of Kimberley, 650 miles inland. This line supplies a curious epitome of the rise and fall of the narrow-gauge agitation. The first 50 miles from Capetown were built in 1860, of standard gauge, with heavy rails, easy gradients and curves. Some 15 years later the line was extended 290 miles further on the 3 ft. 6 in. gauge. Every possible effort was made to diminish first cost; 40-lb. rails were used, and the earthworks were reduced to a minimum by a very free use of 132 ft. grades and 9 degree curves. The engines had 12 in. by 16 in. cylinders and 36 in. wheels, and weighed about 11,000 lbs. per axle. It was soon found that such light engines were incapable of hauling a train heavy enough to earn a good margin above running expenses. The size of the cylinders in successive lots of engines gradually grew to 15 in. by 20 in. with 42 in. drivers. These engines proved far more durable and would haul a paying train, but the 40 lb. rails were fast wearing out, especially on the curves. The cost of the narrow-gauge extension, notwithstanding the great scarcity of timber, water and lime, was only $22,000 per mile. The speed of the through mail trains was, however, but 14 miles per hour; and after a few years of grumbling at the inefficiency of the cheap method of building railroads, the colonists decided in 1880 that they could afford to make all future lines with maximum grades of 66 ft. to the mile and use 70 lb. rails, the greater speed and convenience, and the increased durability of rolling stock and permanent way effecting a reduction in working expenses which would more than offset the increased cost of construction.

Nothing, therefore, now remains of the narrow-gauge light railroads but the gauge; the weight of the rails, and the weight and power of the engines, the size of the cars, etc., having been, by the force of circumstances, increased to the standard-gauge requirements, though the limits of space imposed by the 3 ft. 6 in. gauge have put considerable difficulties in the way. It seems quite possible that at some future time the gauge will be widened. It is satisfactory to know that the narrow gauge was originally advocated by merchants and politicians, and was adopted against the advice of engineers.

Trunk Line Through Passenger Fares.

The Pennsylvania Railroad has so far shown as much firmness in adhering to the regular fares to the West from Baltimore, Washington and Philadelphia while the Baltimore & Ohio charges $3 to $4.50 less, as it did about a year ago in keeping up a rate of $20 from New York to Chicago when other lines were charging $10 or $12. It doubtless loses most of its business at Baltimore and Washington and a good deal at Philadelphia by adhering to this course, but if it should meet the Baltimore & Ohio rates, and the latter should make a farther reduction, as it says it would in such case, then the Pennsylvania would lose all its profit on the Baltimore, Washington and Philadelphia business, and a very large part if not all of its profit on the vastly greater New York business; for a $20 rate could not be maintained from New York when tickets from Philadelphia were selling for $10 or so. As things are the Baltimore & Ohio must be getting nearly all the passengers from Baltimore and Washington, but not making much profit out of the business—not as much as if it were carrying its ordinary share of the passengers at full rates. How long this state of things will continue remains to be seen; but while it continues the through trunk line travel from New York and New England is unaffected, and no one suffers but the Pennsylvania. Rates out of New York have been maintained remarkably well since fares were restored Dec. 1, and no one seems to anticipate trouble from the Pennsylvania's meeting the Baltimore & Ohio rates, which would be sure to cause trouble, so it must be believed that the Pennsylvania will adhere to its present policy. Indeed, we have scarcely ever known so much confidence to exist as to the maintenance of passenger rates on the trunk lines. The first preparations from any pool since the trunk line contract was made regard this business; one is to be made to cover all the through travel in both directions between New York and all the western termini of the trunk lines—Toronto, Buffalo, Salamanca, Pittsburgh and Wheeling. When that is done the trunk lines will insist on getting their proportion of the full east-bound fares (which are now cut $3 at Chicago) as well as west-bound. Perhaps the best evidence of the confidence felt by the trunk lines in their ability to maintain passenger rates is their action in abolishing the payment of commissions not only to the agents of railroad companies but to outside agents as well—it being by such commissions that most cuts of rates are made in times when there is any pretence of adhering to rates. The scalper then becomes really the partner of the railroad company, and is the "wicked partner" on whom the blame is cast for misdemeanors really planned by the company's own officers—an assassin of rates, hired to do a deed which the principal criminal is afraid to do with his own hand.

An agreement for the division of the emigrants arriving at Castle Garden has been made, but there are so many orders out for tickets at $1 to Chicago, etc., issued by the Pennsylvania during the past season, that it will probably be some months before anything can be made out of this business. Not many emigrants arrive before April, however, and unless there are more than last year, of which as yet there is no sign, it will not be a very important matter. The Baltimore & Ohio talks of adhering to a $1 rate from Baltimore, and that may further complicate matters, though it is not probable that the other roads would meet that rate, and it will not be surprising if its differences with the Pennsylvania should be settled any day, though we hear of no efforts being made to bring about that desirable state of things.

Meanwhile the Western connections of the trunk lines seem not to be doing much to restore rates, though except from St. Louis the reduced basis of $17 from Chicago to New York seems to be pretty well adhered to. It seems probable that when the trunk line pool is completed and these lines insist on getting their proportion of $20 from Chicago to New York, with no allowance for commissions, the contrast between their profits and those of their Western connections will incite the latter to greater activity and harmony in keeping up rates on their end of the route. Take $9 from the $17 rate from Chicago to New York and a commission of $2 or so from the $8 remaining, and there is not much profit left on a first-class trip of 500 miles or more.

The Summer Packing Season.

The great increase in the crop of corn last year over any of the three years previous gave reason to expect a large increase in the number of hogs fattened and packed, which had decreased greatly since 1881. In the language of the trade there are two packing seasons, the "winter" season, including the four months from November to February, inclusive, formerly known simply as the "packing season," as nearly all the packing was done in those months. No longer ago than 1875 more than four-fifths of all the hogs packed in the Northwest were packed in these four months; but in 1877 the summer packing rose to one-third of the whole, and in 1880 it was nearly 44 per cent., and for the last two years it has been 43 per cent.

It is common to consider the packing-year as ending with the winter season, at the end of February, but the hogs packed in these twelve months are fattened with the corn of two different years, and we, therefore, below have arranged the statistics for the twelve months ending with October, in which nearly all the animals packed are fatted on one crop. We have added a column, giving the corn crop of the United States (in millions of bushels), which will indicate, to some extent, the dependence of the packing on the corn crop, though as the crop is for the whole United States, and the packing only for the country west of Pennsylvania, they may not be expected to fluctuate together exactly.

	Number of hogs packed.			Corn crop.
Year to Oct. 31.	4 mos. to Feb. 28.	8 mos. to Oct. 31.	Year to Oct. 31.	Millions of bu.
1872-73	5,410,314	1,062,916	6,473,230	1,092 7
1873-74	5,466,200	1 200,444	6,666,644	932.3
1874-75	5,568,228	1,262,343	6,828,500	850.1
1875-76	4,880,135	2,307,866	7,188,001	1,320.1
1876-77	5,10 ,308	2,543,120	7,644,428	1,283.8
1877-78	6,505,446	3,337,044	9,842,490	1,409.0
1878-79	7,480,648	4,051,248	11,531,896	1,540.0
1879-80	6,950,451	5,323,898	12,274,349	1,754 9
1880-81	6,919,456	4,803,689	11,723,145	1,717 4
1881-82	5,747,700	3,210,787	8,958,547	1,194.3
1882-83	6,132,212	3,770,828	9,903,040	1,617.0
1883-84	5,402,064	4,058,838	9,460,932	1,551.0
1884-85	6,460,240	4,853,379	11,313 619	1,795.5

The large corn crop of 1884, therefore, did not fail of its expected effect. Both the winter and the summer packing were nearly 20 per cent. more than the year before. It is true that the year's packing still fell nearly 8 per cent. below that of 1880, from a slightly smaller crop of corn, but this was inevitable, for the three bad corn crops had considerably reduced the stock of hogs, which could not be replenished all at once to the old number, and the requirements, of course, for other purposes are much larger now than in 1880. The increase has been all that could be reasonably expected, making the number last year only 2 per cent. less than in 1879 and 3¼ per cent. less than in 1881, while the summer pack

ing this year has been exceeded only once, in 1880, but then by nearly 9 per cent.

As we have noted from month to month, the *exports* of pork products have not kept pace with the increase in packing—that is, they have remained far below those of the four years from 1878 to 1881. For the last ten years the exports for the year ending with October have been, in thousands of pounds:

Year to Oct. 31.		Year to Oct. 31.	
1876	644,085	1881	1,112,941
1877	750,631	1882	677,721
1878	1,057,498	1883	746,258
1879	1,109,921	1884	640,394
1880	1,278,286	1885	794,917

This is only one of many indications of a very large increase in domestic consumption of farm products since the years when prosperity was most general and labor most generally and constantly employed. This may seem incredible; but when we remember that the population of this country has increased about 16 per cent. since 1880, and that by far the larger part of the product of the country was consumed here, even in the years of the largest exports, we shal understand why it is that while we packed nearly as many hogs last year as in 1879 or 1881, our exports of the product were 33⅜ and 28½ per cent. less. The decrease in packing since 1879 has been about 45 millions of pounds, and the decrease in exports 403 millions, leaving 357 millions more for the home supply; but the increase in population meanwhile has been about 8½ millions, so that the increase in the supply amounts to but 42 lbs. each, which is at the rate of but four-fifths of a pound per week per person, or less than two *ounces* daily of pork, bacon, hams and lard for the additional population. What the actual consumption is we cannot ascertain exactly, as the farming population, which must consume much more than half of the whole, packs its own supply, and this escapes calculation. But as there were in 1880 47,680,000 hogs in the country, and as hogs are nearly all butchered before they are two years old, we may assume that at least 24,000,000 were required for domestic consumption and export in 1880-81. Those packed in the Northwest are certainly much heavier than the average. Their average net weight that year was 208 lbs. Assuming 150 lbs. for all, we have 3,600,000,000 lbs., from which to supply the 1,113,000,000 lbs. of exports and the home consumption, making the latter 2,487 millions of pounds, for about 51 million people, or 48¾ lbs. each.

All comparisons with the years of large crop and exports—1878 to 1880—will be misleading if this growth of the population (and of acreage under cultivation, productive capacity of factories, mines, etc.) is not taken into account. To be doing as well comparatively as in 1879 and 1880 we should produce a great deal more than then. The packing of 1884-85 should have been 14,238,000 instead of 11,314,000 to have been as large proportionally as in 1879-80.

There are several places where there is much packing in winter but very little in summer. The number of hogs packed during the summer season at the different places for the last five years have been:

	1881.	1882.	1883.	1884.	1885.
Chicago	2,700,000	1,634,957	1,900,408	1,859,988	2,475,000
Kansas City	455,111	363,460	588,298	624,361	812,348
Milwaukee	162,447	112,000	104,420	172,504	235,000
Indianapolis	168,050	112,400	196,117	222,067	191,800
St. Louis	350,000	215,176	225,000	289,814	185,000
Cincinnati	145,000	81,916	124,183	127,581	135,000
Louisville	30,000	17,581	28,731	45,302	50,000
Cedar Rapids	200,000	170,289	183,162	192,681	195,850
Cleveland	236,410	150,471	117,631	105,000	144,124
Ottumwa	76,338	58,571	51,500	83,833	79,522
Keokuk	.....	12,846	27,008	37,950	52,234
Sioux City	.....	37,462	46,820	40,396	51,766
Des Moines	32,234	22,735	21,350	33,468	20,477
Nebraska C.	.....	.....	10,000	60,000	60,000
Omaha	48,630	60,066	43,000	30,000	35,000
St. Joseph	40,000	20,000	17,000	30,784	15,958
Detroit	40,199	35,925	33,655	48,863	50,000
Other places	99,320	69,982	59,000	74,498	60,000
Total	4,803,689	3,210,787	3,770,828	4,058,868	4,853,379

Of the whole increase of 794,511 in 1885 over 1884, no less than 615,012 was at Chicago; but compared with other years of large packing, Chicago loses, packing 225,000 less than in 1881, while Kansas City packed 357,237 more. In every year except 1884 Chicago packed more than half of the whole, and until recently no other place (in summer) has packed one-fourth as many as it. Thus, in 1880, when the summer packing was largest, Chicago's share was 2,971,127 (55¾ per cent.), and St. Louis, which stood next, with 410,000, had but 7¾ per cent. But in 1885 Kansas City packed 812,348 and 16¾ per cent. of the whole—nearly one-third as many as Chicago. It is only at Kansas City, however, that there appears any tendency to a great increase in the summer packing, and only at Chicago and there is the business really large. Milwaukee, which packed more last year than ever before and was third on the list, still packed less than 5 per cent. of the whole.

The growth of the business at Kansas City reminds one of the years of greatest growth at Chicago. The summer packing at Kansas City was but 145,638 in 1879, and 239,720 in 1880; thus it has increased 458 per cent. since 1879.

It is noticeable that there is a marked decrease in the summer packing at some places, notably at St. Louis. No Missouri River town except Kansas City shows any marked gain, all of them together last year packed 115,958 last year against 120,784 in 1884.

The Iowa towns taken together show no such gain as might have been expected from the great increase in the corn crop of the state, namely, 399,849 in 1885, against 388,306 in 1884.

In 1880, when the summer packing was largest, nine places packed more than 100,000 each, and together nearly 95 per cent. of the whole number, and seven places packed more than 200,000 each. This year eight places pack more than 100,000 each and together 90 per cent. of the whole, but only three as much as 200,000 each. The changes since 1880 at the places packing most are:

	1885.	1880	Inc. or Dec.	P. c.
Chicago	2,475,000	2,971,127	— 496,127	16.7
Kansas City	812,348	239,720	+ 572,628	238.5
Milwaukee	235,000	136,619	+ 98,381	72.0
Indianapolis	191,800	383,165	— 191,365	50.0
Cedar Rapids	195,850	259,655	— 63,805	24.5
St. Louis	185,000	410,000	— 225,000	55.0
Cleveland	144,124	324,440	— 180,316	55.5
Cincinnati	135,000	110,556	+ 24,444	22.0
Atchison	.....	223,447	— 223,447	100.0
Total	4,374,122	5,058,729	— 684,607	13.5
Other places	479,267	265,169	+ 214,098	80.7
Total	4,853,389	5,323,898	— 470,509	8.8

Since 1880 Atchison has ceased to be a packing point, and the old towns, St. Louis, Indianapolis and Cleveland, have lost half their business. The only gains are at Kansas City, Milwaukee and Cincinnati, and at some of the small places.

The percentage of the whole number packed west of the Mississippi has been for seven years:

1879.	1880.	1881.	1882.	1883.	1884.	1885.
25.4	24.8	27.5	32.2	34.2	34.6	31.2

The great increase in the proportion west of the Mississipp after 1881 was due chiefly to Kansas City, and the fact that Kansas and Nebraska had large crops of corn then, while the states further east, until 1884, had very light ones. The decrease in the proportion this year is due to the better crops of corn in the country which supplies Chicago (largely Iowa and Illinois) and the other places east of the Mississippi.

We have now our second large crop of corn, and we should therefore expect another large increase, in the coming year, in the packing, there having been time to increase the stock of hogs and apparently strong inducements to do so. The free marketing of hogs during recent months also indicates a larger stock; but the report of the Department of Agriculture gives the number Sept. 1 *less* than last year, and decidedly less in most of the states which market many hogs—5 per cent. less in Kentucky, Ohio, Illinois, Iowa, Kansas; 4 per cent. less in Michigan and Indiana; 3 per cent. less in Wisconsin; 2 per cent. in Minnesota; 7 per cent. in Missouri and 15 per cent. in Nebraska. As hogs were very profitable last year, and as the large crop of corn made it easy to keep them and raise more, and as by planting much more corn than ever before the farmers made preparations for feeding an increased number, it is not easy to believe that there has been such a decrease as the Department reported, or any decrease whatever.

The traffic which this business yields is, next to grain, the largest east-bound traffic from the West. It bears better rates than grain, both in the form of hogs and product, and it goes to market almost exclusively by rail. It also profits a larger number of railroads, the provisions being carried all over the country from the West, going in very large quantities to the South and also west to the territories, and to the Pacific coast and to Mexico. The lines which profit most from it are those extending west and southwest from Chicago, but there are many further east which earn a very considerable amount from this traffic.

Chicago through rail shipments eastward for the week ending Dec. 19 for the last two years, by the incomplete report, including flour, grain and provisions, and for the four years previous, by the complete report, including all classes of freight except dressed beef and live stock, have been, in tons:

1880.	1881.	1882.	1883.	1884.	1885.
59,150	54,801	60,294	44,480	53,032	36,930

The shipments thus were 30 per cent. less than last year; but allowing for the higher-class freight, which was more than 14,000 tons a week in November and perhaps averages as much as that now, the total shipments were probably much more than in 1883, and not more than 9,000 tons less than in 1882, when they were greatest. In none of these years except 1881 were rates very badly demoralized at this time. All the railroads have been very busy so far, so that local traffic must have increased. Through business from points south of Chicago may have kept up better than the Chicago business, as a large part of the freight now is new corn, which is fit to ship from the parts of the country that ship via St. Louis and by lines south of Chicago sooner from the country which ships almost exclusively by way of Chicago.

The total shipments and the percentage going by each railroad in each of the last six weeks have been:

	Week ending. Nov. 14.	Nov. 21.	Nov. 28.	Dec. 5.	Dec. 12.	Dec. 19.
Tons:						
Flour	4,571	4,246	6,534	8,216	5,274	5,139
Grain	15,114	18,686	36,246	22,569	23,342	21,269
Provisions	9,695	11,593	11,537	10,443	11,599	10,522
Total	29,890	34,525	54,317	41,228	40,215	36,930
Per cent.:						
C. & Grand T.	10.7	8.6	14.2	16.5	12.3	9.0
Mich. Cen.	19.8	20.0	27.6	18.0	19.0	21.0
Lake Shore	13.5	13.8	11.2	15.4	13.9	15.1
Nickel Plate	11.1	12.4	10.9	8.3	9.8	10.5
Ft. Wayne	17.5	19.8	14.3	21.1	15.9	16.9
C., St. L. & P.	15.6	14.4	9.8	10.8	12.4	11.5
Balt. & Ohio	7.9	6.2	6.2	7.7	9.8	7.0
Ch. & Atlantic	3.9	4.8	5.8	2.2	6.9	9.0
Total	100.0	100.0	100.0	100.0	100.0	100.0

Thus the shipments last week were the smallest for four weeks. The decrease from the previous week was 2½ cent. in flour, 9 per cent. in grain and 9 per cent. in provisions—in the whole 8 per cent. It is not usual for the shipments to decrease in December. In other years they have usually been as large in the later as in the earlier weeks of the month.

The most important change in percentages last week is in the case of the Chicago & Atlantic, which had not taken so large a share before for a long time. The three Vanderbilt roads carried 46.6 per cent. of the whole, and the two Pennsylvania roads 28.4, against 42.7 and 28.3 per cent. the week before, respectively.

The New York grain receipts in November last were greater than in October and about a sixth less than last year, but greater than in 1883. For five years they have been in November (flour included):

1881.	1882.	1883.	1884.	1885.
13,250,913	14,972,993	11,105,616	15,006,219	12,726,864

Thus the receipts this year were but little below the average of the previous four years, which was 13,584,000 bushels; but they compare very unfavorably with the 18,590,447 bushels received in 1880, or the 17,271,726 received in 1879.

The effect of the advance in rail rates made in October is shown in an increase of the receipts by canal, which were larger in November than in any other month of this year except June. They were much less last year, but more than the year before.

The receipts by railroad in November have been:

Year.	Bushels.	Year.	Bushels.
1878	6,247,121	1882	8,884,769
1879	6,465,673	1883	6,106,143
1880	10,285,346	1884	7,939,882
1881	6,604,481	1885	7,303,178

The rail receipts this year were 8 per cent. less than last year, and much less than in 1882 and 1880, but much more than in the other years, and about the average of the seven years previous.

For the 11 months ending with November the total receipts and the receipts by rail at New York have been:

Year.	Bushels.	Year.	Bushels.
1878	77,822,556	1882	70,114,244
1879	95,045,517	1883	73,231,733
1880	86,412,822	1884	67,270,768
1881	94,719,788	1885	84,204,752

Thus the rail receipts were larger this year than in any other since 1881, due doubtless to the rate having been lower, taking the year as a whole, than ever before.

Notwithstanding these low rates, 35 per cent. of the grain, exclusive of flour, was brought to New York by water this year, and in November no less than 55½ per cent.

The distribution of the total rail receipts among the different railroads has been as follows in November for the last three years, the figures being the percentage of the total rai receipts brought by each:

	N. Y. Cen.	Erie.	Penna.	Lack.	W. Shore.	Other.
1885	37.8	32.8	16 7	3 9	6.7	2.1
1884	40.5	25.0	11.5	7.5	14.5	1.0
1883	40.9	38.0	15.3	3.4	1 4	1.0

Thus the West Shore and the Lackawanna, which brought 22 per cent. of the whole last year, brought but 10.6 this year. For the 11 months they brought 17.3 per cent. of the whole this year.

The saw-mills at Minneapolis turned out more lumber during the past season than in any other except 1882, and nearly the same as then, their annual product having been, in *millions* of feet:

1870.	1871.	1872.	1873.	1874.	1875.	1876.	1877.
118.2	117.2	167.9	189.9	191.3	156 7	200.4	129.1
1878.	1879.	1880.	1881.	1882.	1883.	1884.	1885.
130.3	149.8	195.5	234.2	314.4	272.8	300.7	314.0

The increase over last year is 4½ per cent.; over 1883, 15 per cent., and over 1881,34 per cent.

The prevailing tendency to lengthen locomotive runs to an average considerably above the 90 to 100 miles which used to be considered about the proper thing, is well illustrated by the locomotive divisions on the Canada Pacific, of which there are 19 on the 2,445 miles between Montreal, an average run per locomotive of 128¾ miles. The shortest and longest runs are:

4 of 112, 113, 114 and 116	miles respectively.
2 of 118	" "
4 of 120, 121, 125 and 126	" "
6 of 130, 131, 133, 133, 134, 134	" "
1 of 145	" "
2 of 150, 152	" "

Thus the minimum is 112 and the maximum 152 miles.

The first South American transcontinental line seems to be at last on the road to completion. It is now completed from Rosario, some 150 miles from the mouth of the Parana, in the Argentine Republic, and some 350 miles from the general line of the coast, to Mendoza, 492 miles, on the eastern slope of the Andes. On the Chilian side, 100 miles from Valparaiso northwestward have been in operation for some years, and the gap of 140 miles has now been surveyed and in part put under contract, with the present expectation of completing the line through in two years, making a line of 732 miles where the continent is about 1,000 miles wide The work, while heavy, is said not to be excessively so.

Record of New Railroad Construction.

Information of the laying of track on new railroad lines is given in the current number of the *Railroad Gazette* as follows:

Apopka & Atlantic.—Track laid from Mayo, Fla., west 4 miles.

Bangor & Portland.—The *Martin's Creek Branch* is completed from near Bangor, Pa., southward to Martin's Creek, 8 miles.

Greenville & Laurens.—Completed from Laurens, S. C., northwest 28 miles.

Jacksonville, Tampa & Key West.—Extended south to De Land Junction, Fla., 15½ miles.

Minden Branch.—Completed from Minden, La., south to Minden Junction, 5½ miles.

This is a total of 61 miles on 5 lines, making 2,760 miles thus far reported for the current year. The new

track reported to the corresponding date for 14 years has been :

	Miles		Miles.
1885	2,760	1878	2,263
1884	3,693	1877	2,019
1883	6,020	1876	2,278
1882	9,922	1875	1,333
1881	7,870	1874	1,844
1880	6,139	1873	3,630
1879	3,801	1872	7,160

These figures include *main track only*, second tracks and sidings notb eing counted.

NEW PUBLICATIONS.

Report of the Proceedings of the Nineteenth Annual Convention of the Master Car-Builders' Association, held at Old Point Comfort, Va., June, 1885. Edited by M. N. Forney, Secretary.

This volume contains a great deal of interesting matter, comprising reports and discussions on the proper form of wheel treads, the adoption of safe and automatic freight car couplers, the proper method of constructing passenger car framing, the best form of standard brake shoe, the relative advantages of constructing freight cars with and without end platforms, the best form of continuous brakes for freight trains, and many other subjects appertaining to the construction and maintenance of cars. Most of the subjects discussed are illustrated by numerous engravings The various standards adopted at various times by the Master Car-Builders' Association are also very fully and completely illustrated by dimensioned drawings. The book also contains the constitution and by-laws of the Association, a list of members, and last, not least in usefulness, a carefully prepared index.

TECHNICAL.

Locomotive Building.

The Rhode Island Locomotive Works in Providence are building three mogul freight engines, with 18 by 24 in. cylinders, for the Canada Atlantic road and six narrow-gauge consolidation engines for the Union Pacific. They are also at work on the large order for the Chicago, Burlington & Northern road.

The Manchester Locomotive Works in Manchester, N. H., are building four passenger and two shifting engines for the Boston & Lowell road. They last week delivered a mogul engine with 19 by 24 in. cylinders to the Concord road.

The Concord Railroad shops in Concord, N. H., have nearly completed a heavy passenger engine for the road.

The Brooks Locomotive Works in Dunkirk, N. Y., last week delivered a freight engine to the Cincinnati, Wabash & Michigan road.

The Altoona shops of the Pennsylvania Railroad not long since turned out an experimental freight locomotive of the new Class R, which is the heaviest locomotive in use by the company, and is intended for hauling freight over the mountain grades. The shops have now received orders to build 15 more locomotives of the same class.

The Car Shops.

The Ohio Falls Car Co. will start up its shops in Jeffersonville, Ind., on Jan. 1 next, having received several orders for cars.

The Anniston Car Works, in Anniston, Ala., are at work filling an order for cars for the East & West Railroad.

Bridge Notes.

The Phœnix Bridge Co. at Phœnixville, Pa., is completing the new bridge over the Mississippi at Keithsburg, Ill., for the Central Iowa road. This bridge has a draw-span 360 ft. long, a raft span of 355 ft. and seven other fixed spans of 205 ft. each. There are 800 ft. of trestle work in the east approach and 900 ft. in the west approach. The contractors for the foundations were Wm. Sooy Smith & Son, and for the masonry Drake & Stratton.

The Troy Iron Works, in Troy, Ala., have just completed the iron work for a draw-bridge at Geneva, Ala., over the Chocktawhatchie River.

Iron and Steel.

The blast furnace of the Oxford Iron Co., at Oxford Furnace, N. J., was started up last week, and the rest of the works will be put in operation about Jan. 1.

The furnace and property of the Virginia Iron & Steel Co., at Buffalo Gap, Va., has been sold to New York and Philadelphia parties, who will start up the works as soon as necessary repairs can be made.

Stack No. 2 of Lehigh Furnace, at Aineyville, Pa., has gone into blast again, repairs having been completed.

The Montour Iron & Steel Co., at Danville, Pa., will start up a portion of its works about Jan. 1.

Preparations are being made to put Pequest Furnace, in Warren County, N. J., into blast.

The Coplay Iron Co. started up an additional furnace at Coplay, Pa., this week.

The Allentown Iron Co. has a large force of men employed repairing Roberts Furnace, and will put it into blast in January.

Lucy Furnace, at Clinton, Pa., will go into blast early in January. It has been idle for 3 years past.

The Brierfield Coal & Iron Co. is remodeling its furnace at Brierfield, Ala., so as to use coke instead of charcoal for fuel. It is expected that it will be ready to start up by the end of January.

J. W. Garrett & Co., brass foundrymen, have completed this week an order from the Litchfield (Ill.) Car Co. for 6,000 car axle bearings. The company is now introducing a new combination bearing, the shell of which is wrought iron, the intermediate piece brass, and the wearing surface babbitt metal. The St. Charles Car Co. has ordered 500 of the new bearings in the way of an experiment, and some of the railroads have given small trial orders.—*St. Louis Age of Steel.*

Manufacturing and Business.

The Ferracute Machine Co. intends shortly to enlarge its works at Bridgeton, N. J., and in preparation is now putting in a new 60 H. P. steel boiler, which will give the additional power needed. The new tools to be put in will include a special boring mill and several other special machines. The company has recently brought out several new "Ferracute" punching presses of improved design and great weight and strength, which are meeting with much favor. Among numerous orders lately received is one from Germany.

The Rail Market.

Steel Rails.—There is still quite a heavy demand and several large orders are on the market; prices are firm at $34@$35 per ton at mill, and there is no disposition to shade prices even for large and desirable orders.

Rail Fastenings.—Spikes are quoted at 2.25 cents per pound in Pittsburgh; track bolts at 2.60@2.85 cents, and splice-bars at 1.65@1.75 cents. An increased demand and firmer prices are reported.

Old Rails.—The market for old iron rails is active and excited, although few actual sales are reported and quotations vary from $18.50@$20 per ton at tide-water. There is a considerable demand for old steel rails, with a light supply, and they are quoted at $19@$21 per ton in Pittsburgh.

Air Brakes for Circus Trains.

As a measure of prudence and precaution, the Association of Western Freight Agents has passed a resolution recommending that hereafter no cars belonging to circuses be transported over Western roads unless equipped with automatic air brakes.

Engineers' Society of Western Pennsylvania.

The monthly meeting of the Society was held in Pittsburgh, Dec. 15.

Mr. Metcalf stated during the discussion of a paper read by Captain Hunt, that he considered pure steel to consist of iron and carbon in proportions according to its use, and not containing more than $\frac{1}{100}$ of 1 per cent. of impurities.

Captain Hunt stated that the Pittsburgh Testing Laboratory had decided that manufacturers using old rails in place of muck bar in making iron, must so state in their specifications, out of fairness to their competitors, without regard to the success of the test.

Other members considered that the material of which structural iron was made should be specified. Mr. Zimmerman stated in support thereof that iron made of old rails might pass the chemical and mechanical tests, and yet might not prove so durable as iron made from muck bar.

Resolutions of respect on the death of A. J. Coulter, a member of the society, were passed, as was a resolution thanking the Chief Engineer of the United States Army for documents furnished the Society.

The Committee on Nominations presented the following names to be balloted for at the next meeting: President, S. F. Fisher; Vice-President, E. B. Taylor; Secretary, S. M. Wickersham; Treasurer, A. E. Frost; Directors, W. L. Scaife and F. C. Phillips.

Proposed Elevated Railroads in Boston.

A petition filed with the Secretary of State proposes to incorporate John W. Chandler, M. Denman Ross, Bainbridge Wadleigh, George C. Barrett and others as the Boston Elevated Railroad Co., to build elevated roads, operated by electricity, to Milton, Brookline, Cambridge and West Roxbury, with a belt road connecting the northern and southern railway depots. The projectors believe they have secured advantages over any plan of elevated railway yet constructed. The model selected is that known as the Riley patent, owned by the Riley Elevated Railway Construction Co. of New Jersey. The plan of construction requires but a single line of posts, but two lines may be employed, according as the width of the street and other considerations may determine. It is not yet determined what form of electric motor to employ, but it has been decided to use no separate motor, but to place an engine of propulsion in every third car.

Examinations for Color Blindness.

The Chicago, Burlington & Quincy Railroad Co. has fitted up a car with suitable apparatus, which it is now running over the road, for the purpose of examining employés as to color blindness. The car stops at all stations for the purpose of testing the eyes of the switchmen, agents and all others connected with the running of trains.

Overhead Bridges in Vermont.

A few years ago a law was made in Vermont requiring that, within a time fixed, all overhead railroad structures should be at least seven feet above the running board on the tops of freight cars. All new construction has been conformed to this law, but there are still many old highway bridges so low as to endanger the lives of brakemen, and, strange as it may seem, the railroad companies have not erected whip-lash warnings or any other signal to inform a man who is not looking of his proximity to a bridge. A few days ago the Central Vermont proceeded to raise two highway bridges in Middlebury, one 27 in. and the other 35 in., but the selectmen got them enjoined, and the bill is not returnable until the June term of Addison County Court. The selectmen contend that the railroad company has no right to touch the town's bridges, but should lower its tracks in order to comply with the law.—*Boston Advertiser.*

The Brooklyn Bridge Grip.

Mr. Chas. T. Porter contributes to the *American Machinist* the following interesting account of the much abused "grip" used on the Brooklyn Bridge :

"The idea lying at the bottom of the Paine grip is an excellent one. This is, to avoid injury to the cable from running through the jaws of a grip, while these jaws are being closed upon it, and the car is either at rest, or is being gradually put in motion. The Paine grip consists of two pairs of wheels, which are closed on the cable. As soon as these touch the cable they begin to revolve, and the periphery of the wheel and the cable move together. Then an increase of the pressure tightens brake-blocks located inside the rim of each wheel, increasing also the force with which the cable is seized between the wheels. As the resistance of the brakes arrests the revolution of the wheels, the car receives the motion which the wheels lose, and when the latter are brought to rest, the car has the full motion of the cable.

"This elegant and fascinating system was found, however, in practice, in the form in which it was embodied by Col. Paine, as above described, to be wanting in power, as well as in security against losing the hold on the cable. The requirements of the bridge traffic are very severe. The cars are large, and can hold standing, inside and on the platforms, four passengers in addition to each one they will seat, and the inclines up which they are drawn are 3½ ft. in 100 ft.

"It is obvious that, in order to be reliable, a grip should not only be certain to retain its hold on the cable, but should possess a reserve of power to seize the cable—should have the ability to grasp the cable with a force much beyond that which it is necessary to employ.

"Under the exactions of the bridge traffic it was found impossible to make the Paine grip always answer, even when, as was the regular practice, it was strained to its utmost capacity. The difficulty was greatest in wet weather. It was found necessary to make the periphery of the wheels of leather, which, when moist, often failed to hold the cable from either slipping or being pulled by the downward stress out of the grasp of the wheels.

"To remedy these defects an auxiliary grip, consisting of a pair of solid dies, has been added to the original Paine grip. These dies are intended to be closed on the cable after the cars have attained their full motion, but before they begin to ascend the incline. This was another excellent idea. But a difficulty existed in the way of its practical application. The obvious way of operating this auxiliary grip would be by means of an independent hand-wheel and chain and system of levers. These, however, would introduce so much complication as to be inadmissible, and so one connection is made to operate both the wheels and the solid jaws. But to save the cable the latter must not seize it until the car has got its motion. One movement then must first bring the wheels together with force sufficient to get up the speed on a level track and then must bring the solid jaws into action. Every mechanic will see that this presents a problem of exceeding difficulty. It is probable that the accidents which have occurred lately have been occasioned by the failure of the auxiliary grip to perform its function.

"In spite of this failure, however, this accident would have been prevented if the brakes on the first and second trains had not failed to work. The powerful atmospheric brakes with which the cars are provided are ample to hold them, and have doubtless prevented many accidents; but this time the failure of the grip was supplemented by the failure of the brakes. The brake is worked by the same hand wheel by which the grip is operated, it being necessary for the brakeman to change the connection. In this case something prevented this being done. It would seem as if a very earnest inquiry ought to be made, in a case where human life is at stake, for something more reliable than the present devices, which present a complication that every mechanical engineer will say ought by all means to be avoided."

Engineers' Club of Philadelphia.

A business meeting of this Club was held in the Club's house in Philadelphia Dec. 5, President J. J. De Kinder in the chair; 35 members and 1 visitor present.

The Tellers of election reported the following candidates elected members: *Active:* E. B. Wingate, Henry C. Zacharias, Louis G. Laureau, Fred. W. Gordon, W. M. Patton, Victor O. Strobel, A. Saunders Morris, A. B. Broomell, Howard Wood, Wm. F. Mencke and Lewis N. Lukens. *Associate:* Frank K. Esherick and L. Frank Gordon.

Messrs. Rudolph Hering and Henry G. Morris were announced as the House Committee of the board of directors, under the new by-laws.

The Secretary presented a communication from Mr. W. H. Ridgway, recommending that any professional question which might arise in the experience of any member be presented to a committee of the Club, and referred, for solution or answer, by that committee to some member whom the committee considered to be experienced in the specialty to which it referred. No objection was offered to the adoption of such a measure, but no action was taken. Officers were nominated to serve during the year 1886.

Mr. John T. Boyd, for Mr. Washington Jones, presented to the Club some specimens of artificial fuel made in Belgium, and sent to him from there by Mr. E. F. Loiseau, who is now abroad experimenting on its manufacture.

The specimens are on exhibition at the house of the Club, and consist of cylinders having a hole along their axes, cubes, perforated square blocks and two sizes of egg-shaped masses corresponding about to our egg and stove sizes of anthracite coal. This fuel is made of bituminous coal dust, coal tar pitch and clay, mixed in suitable proportions and compressed into the shapes named. Some few years ago, Mr. Loiseau was making the smaller of the egg-shaped sizes in Philadelphia, and then the material was passed through rollers having recesses which formed the eggs. A peculiarity of these eggs was that they retained their shape until all the combustible material was entirely consumed, and then fell apart in a fine powder. The specimens shown bore labels stating the quantities of the several sizes made per day.

Mr. Boyd also desired to make an acknowledgment of his indebtedness to Messrs. Elliott Brothers, opticians, of London, England, and Mr. A. Amsler, the inventor, for information of value in regard to the correct methods of working the polar planimeter, which they very kindly sent him, and which he is now arranging in a convenient form for the Club *Reference Book.* Mr. Boyd's correspondence was with Messrs. Elliott Brothers, and was by them referred to Mr. Amsler for detailed reply.

Mr. C. W. Buchholz presented a paper of more than ordinary interest upon Engineering; its Achievements and its Reward. A view is taken—broad, historical and practical—of what the man of technical science has done for his fellowmen; of how essential he is to human progress; and of how his results, and more especially, he himself, are acknowledged and appreciated when his share is alloted him by those who pocket the millions which are the direct proceeds of the creations of his intellect. The special thanks of the Club were tendered to Mr. Buchholz for his very interesting and entertaining paper.

Baldwin Engines for New South Wales.

Some discussion has taken place in the New South Wales Legislature as to the engines lately built by the Baldwin Locomotive Works for the New South Wales government railways. Our readers will remember that one of these engines was illustrated in our issue of March 27, 1885. The Minister for Railways informed the House that the original cost of the ten American engines imported during the present year was $12,653 each, for both freight and passenger engines. The total cost of each, including all alterations, repairs, etc., to date was, for passenger engines, $14,615, and goods-engines, $14,527.

THE SCRAP HEAP.

Why the Locomotive is Called "She."

"Why," asked the fat passenger, "does an engineer always call his engine 'she?'" There was a moment of embarrassing silence, when the man on the wood box said something about "her headlight," which was followed by a hollow groan all along the line. "Because," ventured the tall, thin passenger, "the more you throttle her the faster she goes." But this was barred out under the rules. The man with the sample case suggested, "because she runs the mail," but everybody said "ah there!" so sarcastically that he apologized. The cross passenger said "because there was so much bustle and bang about her," and he was fined cigars for the crowd on the spot. The bashful passenger said maybe it was because she "pulled the smoker," and he was hissed off the stage. And longer had they sung, but the woman who talks bass closed the lodge by croaking, "Because we couldn't get along without her."—*Burdette.*

In the Smoking Car.

The late Josh Billings was once on a passenger train bound for his old home at Lanesboro, Mass. On the train were several commercial travelers, who, to while away the time, proposed a game of whist. A fourth man was wanted, and a gentleman sitting near was requested to take a hand.

"No; I do not play. But there is an old fellow who is a capital player; try him"—pointing to the "old fellow," who sat demurely on the seat in front.

"Good player, is he?" said the commercial man. "Then we'll have some fun with old Hayseed;" and accosting the quiet, farmer-like passenger, the young man, whose cheek was his fortune, blandly said: "My venerable friend, we would like to have you take a hand in a game of cards with us, just to while away the time. Will you oblige us?"

Looking the young man in the face a moment, "old Hayseed" answered, "Ya-as, we'll be there in abaout three hours."

"You don't understand, my friend; we want you to take a hand—"

"Ya-as, the stand o' corn is very good—oncommon handsome."

The commercial man was annoyed. "Speak a little

louder," suggested the gentleman in the seat behind; "he is somewhat hard of hearing."

"My friend!" shouted the young fellow, "will--you—take—a—hand—in—a—game?"

"Ya-as, game is oncommon plenty; all you went is——"

"Oh, go to the devil! You're as deaf as a post!" and the man of cheek subsided, amid the laughter of his companions.

When Lanesboro was reached, "old Hayseed" arose to depart, when he quietly handed his card to the commercial man, who sat glum in his seat, and in a particularly comical way remarked: "Young man, when you travel on your cheek, don't get hayseed in your eye. *See?*"

The young fellow glanced at the card. The superscription was—"Josh Billings."

Josh got off the train, and the man of cheek had to find a seat in another car to escape the "run" on him by his companions.—*Editor's Drawer in Harper's Magazine for January.*

A Round-House Retort.

Somewhere back in the seventies, when business was very dull in the South, the A. & B. road had just gone into the hands of a receiver, and it seemed the D. & C. was likely any day to be put in the same boat. The A. & B. and the D. & C. roads crossed each other at Antioch, which was division headquarters for both roads. The A. & B. had been paying its employés regularly every month, so the men had no grounds for complaining on that score. The D. & C. was not so fortunate, for it was months in arrears to its employés. The Court said the A. & B. must be worked well within its earnings, so as business got duller, first one train crew came off and then another until it looked as all hands would go. It was announced one day at Antioch in the presence of quite a crowd of men from both roads by a D. & C. conductor. "So the A. & B. has taken off another freight crew, has it?" The A. & B. boys looked a little nonplussed and seemed not to enjoy the joke. Jimmy McD., an old A. & B. brakeman, hesitated a minute and then said, with a drawl: "That's jest about so, boys, but she haint tuk off the pay train, and don't you forget it." The laugh was then all on the other side, and historical truth compels the statement that the D. & C. boys didn't have enough of the ready to set 'em up for the crowd.

How George Stephenson Bought a Bonnet.

George Stephenson, at the early age of eight, was capable of turning his little hands to profitable account. One day his sister Nell went into Newcastle to buy a bonnet, and George went with her for company. At a draper's shop, in the Bigg Market, Nell found a "chip" quite to her mind, but on pricing it, alas! it was found to be 15 pence beyond her means, and she left the shop very much disappointed. The bold courage of the lad under difficulties now asserted itself, and turning to his sister, he said: "Never heed, Nell; see if I canna win siller enough to buy the bonnet. Stand ye there till I come back." Away he ran, soon disappearing amid the market throng. Long and long she waited, until darkness crept on, the market people had disappeared, and at last Nell began to despair. Fears as to his having met with an accident were beginning to present themselves to her youthful imagination, when at last he came running up, quite breathless. "I've gotten the siller for the bonnet, Nell!" cried he, exultantly. "Eh, Geordie!" she said, and for one brief moment the shadow of doubt crossed her countenance as she continued, "but hoo hae ye gotten it?" "Haudin the gentlemen's horses," was the unhesitating reply. The bonnet, it is needless to add, was bought forthwith, and both returned in glee to Dewley. Fortunately for Geordie, neither hitching weights nor telegraph poles were then in common use.—*Railway Express.*

A Runaway Train.

A dispatch from Hawley, Pa., Dec. 19, says: "For 33 years coal and passenger trains have been run between Dunmore and Hawley and Pittston and Hawley, over the Pennsylvania Coal Co.'s gravity road. In all that time, with scores of trains running daily each way, there had been no serious railroad accident, and none that caused the company much loss. The road was abandoned yesterday for a more direct transportation route, and on that day, singularly enough, the greatest wreck in its history occurred. The trains on the road were hauled up the steep planes by stationary engines and wire ropes. A loaded coal train was being thus drawn up Plane No. 9, and when it was almost at the summit the connection with the wire rope on the head car gave way. There was a momentary stoppage of the train before it started back down the incline, and the trainmen leaped for their lives. The next instant the train was dashing down the plane at lightning speed. Every car kept the rails, and when the foot of the plane was reached the speed of the train was so great that, in the language of a by-stander, 'it looked like a black streak flashing along the track.'

"From the foot of the plane there is a stretch of level track for 100 yards, and then the track drops suddenly down the steep incline of Plane 8, one of the longest on the road. The runaway train reached the head of this plane with speed but slightly diminished, plunged over the hill, and went thundering towards the foot. Another coal train meanwhile was being hauled up Plane 8. The car-runners on this train saw the runaway cars rushing like an avalanche down upon them, and sprang from their posts just as the collision occurred. Cars were thrown high in the air, and then over the embankment, and their contents were scattered for hundreds of feet around. The cars that were at the rear end of the train which was passing up the plane as the runaway cars came down kept the rails, and in their turn became runaway. They were soon rushing along at as terrific a rate of speed as the others had attained, and striking the level at the foot of the plane they tore along the track toward the next plane below. They never reached it. At a curve in the road a short distance below the plane they were thrown from the rails, and were hurled into a ravine nearly 100 ft. below, carrying trees, rocks and débris along with them to the bottom. It was fortunate that they were thrown from the track, for a short distance further on they would have met another train on which were a number of trainmen. It would have been impossible for any of them to have reached a place of safety, and great loss of life must necessarily have followed the crash."

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Cleveland & Fittsburgh, annual meeting, at the office in Cleveland, O., Jan. 6.

Columbus, Hocking Valley & Toledo, annual meeting, at the office in Columbus, O., Jan. 12.

Connecticut River, annual meeting, at the office in Springfield, Mass., Jan. 20, at noon.

New York, New Haven & Hartford, annual meeting, in New Haven, Conn., Jan. 13.

Philadelphia & Reading, annual meeting, at Association Hall, in Philadelphia, Jan. 11, at noon.

Philadelphia, Wilmington & Baltimore, annual meeting, at the office in Wilmington, Del., Jan. 11.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Bull's Gap, 5 per cent., payable Dec. 31, to stockholders of record on Dec. 21. This is the first cash dividend; a scrip dividend of 15 per cent. was paid in January, 1883.

Housatonic, 3 per cent., semi-annual, on the preferred stock, payable Jan. 9. This company changes from quarterly to semi-annual payments.

Mineral Range, 2½ per cent., quarterly, payable Jan. 5, to stockholders of record on Dec. 31.

New York, Lackawanna & Western (leased to Delaware, Lackawanna & Western), 1¼ per cent., quarterly, payable Jan. 2.

Woodruff Sleeping & Parlor Coach Co., 1¼ per cent., quarterly, payable Jan. 1.

Railroad and Technical Conventions.

Meeting and conventions of railroad associations and technical societies will be held as follows:

The *Master Car-Builders' Association Committee on Freight Train Brakes* will hold a meeting and hearing at the Lochiel House, in Harrisburg, Pa., on Wednesday, Jan. 6, 1886.

The *American Society of Civil Engineers* will hold its annual meeting at the Society's House, in New York, on Wednesday, Jan. 20, 1886.

The *Master Car-Builders' Club* will hold its regular monthly meetings through the winter at the rooms, No. 113 Liberty street, New York, on the evening of the third Thursday in each month.

The *New England Railroad Club* will hold its monthly meetings at its rooms in the Boston & Albany passenger station in Boston, on the evening of the second Wednesday in each month.

The *Western Railway Club* will hold its regular monthly meetings at its rooms, No. 103 Adams street in Chicago, on the third Wednesday in each month.

Foreclosure Sales.

The *Texas & St. Louis road, Missouri & Arkansas Division*, will be sold at public sale at the Custom House in St. Louis, on Feb. 27, 1886, by Special Master George H. Shields, under the decree of foreclosure and sale granted by the United States Circuit Court. The sale will include the entire line from Texarkana to the Mississippi River opposite Cairo, 418 miles, with the Magnolia Branch, 6½ miles, and the New Madrid Branch, 5½ miles, and all the equipment, franchises, etc. The minimum price fixed by the decree is $1,000,000, and the purchaser will be required to assume certain claims and debts specified in the decree. The purchaser will be required to pay $75,000 in cash at the time of the sale, as a guarantee that the bid will be made good, and will further be required to pay in cash $100,000 on confirmation of the sale, the balance to be payable in cash, in receiver's certificates or other prior lien claims, or in first mortgage bonds and unpaid coupons at their *pro rata* value, to be fixed by the Court.

ELECTIONS AND APPOINTMENTS.

Baltimore & Philadelphia.—At the annual meeting in Wilmington, Dec. 15, the following directors were chosen: Wm. Canby, Wm. M. Canby, Victor Dupont, Wilmington, Del.; H. S. Burgesser, John M. Cleave, Thomas M. King, James B. Washington, Pittsburgh, Pa.; Samuel Spencer, Baltimore; James McC. Creighton, Philadelphia. The board elected the following officers: President, James B. Washington; Vice-President, Samuel Spencer; General Manager, Bradford Dunham; Secretary, J. C. Farra; Treasurer, W. H. Ijams; Auditor, W. T. Thelin.

Chesapeake & Ohio.—Mr. C. W. Smith having resigned, the office of General Manager is abolished. The executive duties formerly pertaining to that position will be assumed by General Williams C. Wickham, Second Vice-President, office at Richmond Va., to whom officers in charge of the operating and traffic departments will report and from whom they will receive orders.

Chicago, Milwaukee & St. Paul.—This company has removed its Boston office to the "Old State House," No. 210 Washington street, where Henry D. Corbett, New England Freight Agent, and Charles A. Brown, New England Passenger Agent, will be glad to see all their old and as many new friends as may see fit to favor them with their patronage.

Chicago & Northwestern.—Hon. W. C. Goudy has been appointed General Solicitor, to date from Jan. 1, in place of Mr. Burton C. Cook, resigned.

Cincinnati, Hamilton & Dayton.—Mr. Charles Neilson is appointed General Superintendent and will take charge Jan. 1. The road has had no General Superintendent for several years. Mr. Neilson was for 11 years on the Erie road, and a little over a year ago resigned the position of Superintendent of the Buffalo and Rochester divisions of that road to become Assistant to the President of the Laflin & Rand Powder Co. Mr. Neilson's office will be in Cincinnati.

Eastern & Western Air Line.—The officers of this company are: T. W. Osborn, President; Waldorf H. Phillips, First Vice-President and Treasurer; S. L. Merrill, Second Vice-President; J. W. Coley, Secretary; W. C. Mobley, General Superintendent; H. A. Schwanecke, of Pittsburgh, Chief Engineer.

East Tennessee, Virginia & Georgia.—Mr. Frank J. Hoyle has been appointed Car Accountant, with office in Knoxville, Tenn.

Fort Mason, Seneca & St. Johns River.—The following are the officers of this new Florida company: President, R. McS. Byrne, Fort Mason, Fla.; Vice-President, Dr. W. W. Hicks; Secretary and Treasurer, W. S. Burdett; Engineer, E. G. Reher; Attorney, W. B. Owen, Esq., Jacksonville, Florida.

Illinois Central.—The following order from General Manager E. T. Jeffery has been issued:

"The following appointments will take effect Jan. 1, 1886: Mr. C. A. Beck, General Superintendent, with office in Chicago. Mr. T. J. Hudson, Superintendent of Illinois and Iowa Divisions, with office in Chicago. Mr. A. W. Sullivan, Division Superintendent of Chicago Division, with office in Cairo. Mr. Wm. Renshaw, Acting Assistant Superintendent of Machinery."

Mr. Beck succeeds Mr. Jeffery, whose promotion to the office of General Manager was noted last week. Mr. Hudson is transferred from Cairo to Chicago and is succeeded at Cairo by Mr. Sullivan, whose former position is taken by Mr. Renshaw.

Memphis & Charleston.—Mr. Frank J. Hoyle has been appointed Car Accountant, with office in Memphis, Tenn.

Nantasket Beach.—At the annual meeting in Boston, Nov. 16, the following directors were chosen: John W. Hobart, Thomas Leavitt, Henry Norwood, Linus M. Price, Andrew F. Reed.

Ohio & Mississippi.—Mr. H. E. Averill having resigned the position of Auditor, Mr. E. P. Cutler has been appointed Acting Auditor, taking effect Dec. 15. Mr. Cutler was several years in the service of the Chicago & Northwestern, and at one time was General Ticket Agent of the Chicago & Milwaukee road before the consolidation, and after some years in other business has recently served as an inspector of accounts of different railroads and other enterprises.

Richmond & Danville.—A circular from Traffic Manager Sol. Haas announces that the resignation of Mr. Mercer Slaughter, General Passenger Agent, had been accepted, and until further notice Mr. C. W. Chears, Assistant General Passenger Agent, is charged with the supervision of the passenger department, and his authority will be respected in all matters pertaining to it. Mr. Chear's headquarters for this purpose are temporarily removed from Atlanta to Richmond.

St. Louis & Hannibal.—The incorporators of this company (successor to the St. Louis, Hannibal & Keokuk) are: John I. Blair, Blairstown, N. J.; DeWitt C. Blair, Belvidere, N. J.; Erving C. Case, Hannibal, Mo.; Walter C. Larned, Percy R. Pyne, New York.

Salina, Columbus & Southeastern.—The officers of this company are: President, W. B. Stone; Vice-President, Charles H. Blair, of New York; Secretary, J. R. Hallowell; Treasurer, C. L. Woodruff; General Manager, R. H. Lawton. The offices are at Columbus, Kan., and No. 149 Broadway, New York.

Savannah, Dublin & Western.—The officers of this new company are: Albert B. Linderman, of Philadelphia, President; D. G. Hughes, Vice-President; D. M. Hughes, Secretary; T. F. Johnson, Treasurer; John M. Stubbs, Attorney; Arthur Pou, Chief Engineer.

Shreveport & Houston.—The offices are at Shreveport, La.; the officers are: C. L. Bremond, President; M. G. Howe, General Manager; S. T. DeMilt, General Agent; George P. Sheldon, Chief Attorney. Mr. Howe is also Receiver of the Houston, East & West Texas road.

Toledo, Ann Arbor & North Michigan.—At the annual meeting in Toledo, Dec. 14, the following directors were chosen: J. M. Ashley, J. M. Ashley, Jr., Wm. Baker, M. D. Carrington, John Cummings, D. Robison, Jr., Toledo, O.; G. A. Evans, W. V. McCracken, New York. The board elected J. M. Ashley President; W. V. McCracken, Vice-President.

PERSONAL.

—Mr. Wm. H. Hall, late Division Engineer on the South Pennsylvania road, is now Engineer for Collins & Farwell, contractors on the new Croton Aqueduct. His headquarters are at Kingsbridge, New York.

—Mr. Burton C. Cook, for 14 years past General Solicitor of the Chicago & Northwestern Railway Co., has resigned that position, to take effect Jan. 1. Mr. Cook has conducted many important suits for the Northwestern Co., and has a high reputation as a railroad lawyer.

—Hon. Wm. C. Pierrepont died at his residence at Pierrepont Manor, N. Y., Dec. 20, aged 82 years. He inherited from his father a great tract of land, including over 50,000 acres, in Jefferson and Oswego counties in New York, and devoted himself to the care and development of this estate, which is now of great value. Mr. Pierrepont was largely concerned in the building of the Rome, Watertown & Ogdensburg road, and was for many years a director of that company and for some time its President.

—At the first meeting of the new board of directors of the Maine Central Co. the following resolutions were adopted:

"*Resolved*, That in the death of Hon. Abner Coburn this board and the Maine Central Railroad Co. have met with a loss such as rarely happens to men associated together in business relations. Connected with the Somerset & Kennebec Railroad from its incorporation, more than 30 years ago, he was the main pillar of that enterprise; and from that time forward until his death he was among the foremost in developing the resources of the state by the building up and extension of our railroad system. In his 30 years' service as director and the three years' service as President of the company, he exercised that wonderful sagacity which led to embarking in enterprises of real merit, and avoiding any which have come to disastrous or unfortunate results. In the dark days through which the company has passed he has never lost his confidence in its ultimate success, and to that end he has given his able services, his sound judgment, and even the pledge of his private fortune in a crisis in which nothing else saved it from most serious embarrassment. In the judgment of this board, the success which the company has attained is largely due to Governor Coburn, and they desire to put on record this expression of their appreciation of the obligation this company is under to him."

TRAFFIC AND EARNINGS.

Petroleum.

The production and shipments of the Pennsylvania and New York oil wells for November are given by *Stowell's Petroleum Reporter* as follows, in barrels of 42 gallons:

	1885.	1884.	Inc. or Dec.	P. c
Production	1,761,660	1,811,700	D. 50,040	2.8
Shipments	1,857,080	2,078,261	D. 221,181	10 6
Stock, Nov. 30	34,668,437	37,925,756	D. 3,257,319	5 7
Producing wells	23,295	21,859	I 1,436	6.0

Of the total production the Alleghany District in New York furnished 12.1 per cent.; the Bradford District in Pennsylvania 38.9; the Warren District 11.2, and the Lower District 37.8 per cent.

Stock on hand decreased 95,420 barrels during the month, that being the excess of shipments over production.

Shipments for the month were as follows, in barrels:

	Crude.	Refined.	Total.	P. c.
New York	473,549	83,989	557,538	30.0
Philadelphia	445,145	130,265	575,410	31 0
Baltimore	55,320	26,538	81,858	4.4
Boston	20,773	63,039	83,812	4.5
Cleveland	235,018	... .	235,018	12 7
Pittsburgh	74,598	... .	74,593	4.0
Local points	173,157	75,689	248,846	13.4
Refined at Creek refineries	379,520	.....	.....	.
Total	1,857,080	379,520	1,857,080	100.0

In this statement the refined oil is that refined at the Creek refineries; it is reduced to its equivalent in crude, so that the total expresses the entire amount of crude oil shipped to each point named, whether in crude or in refined form.

Coal.

Coal tonnages for the week ending Dec. 12 are reported as follows:

	1885.	1884.	Inc or Dec.	P.c.
Anthracite	722,059	735,362	D. 13,303	1.8
Eastern bituminous	199,719	177,648	I. 22,071	12.4
Coke	66,078	56,429	I. 9,649	17.1

The anthracite coal market is quiet, and a general reduction of prices is reported.

Bituminous coal trade is active, and the shipments are unusually large for this season.

The coke trade continues to improve, and the shipments are heavier than at any time for over a year past.

The coal tonnage of the Chesapeake & Ohio Railroad for the eleven months to Nov. 30 was:

	1885.	1884.	Increase	P. c.
Coal	1,049,127	783,875	265,252	33.8
Coke	112,957	70,438	42,519	60 4
Total	1,162,084	854,313	307.771	36.0

The increase this year is in all classes, but is largest in the New River and other steam coals.

Pennsylvania Railroad coal tonnage for the week ending Dec. 12 was:

	Coal.	Coke.	Total.	1884.
Line of road	177.395	64,442	241,837	195,901
From other lines	102,868	1,636	104,504	74,905
Total	280,263	66,078	346,341	270.806
Year to Dec. 5	10,853,958	2,497,337	13,351.295	12,687,585

Increase for the week, 75,535 tons, or 25.9 per cent.; increase for the year, 663,710 tons, or 5.2 per cent.

Railroad Earnings.

Earnings of railroad lines for various periods are reported as follows:

	1885.	1884.	Inc. or Dec.	P.c
Eleven months to Nov. 30:				
Ala. Gt. South	$960,486	$1,016,023	D. $55,537	5.5
Char., Col. & A.	734.627	692,431	I. 42,196	6 4
Cin., N. O. & T. P.	2,419,830	2,419,155	I. 675	...
Cin., W. & Balt.	1,554,151	1,680,684	D. 136,533	8.1
Col. & Greenville	620.957	604,924	I. 16,033	2.7
Des. M. & Ft. D.	347.420	324,597	I 22,823	7.3
Georgia Pacific	600,344	528,382	I. 71,962	13 6
Mexican National	1,404,479	1,456,790	D. 52,311	3.6
Minn. & St. L.	1 618,091	1,642,199	D. 24,108	1.5
Nash., C. & St. L.	1,941.200	2,161,170	D. 219,970	10.2
Net earnings	785,326	930,980	D. 145,654	15 6
N. O. & Nor'east.	615,311	445,357	I. 169,954	38.2
Vicks. & Mer.	412,127	444,385	D. 32.258	7 3
Vick., Shre. & P.	378,655	237,282	I. 141,373	59.7
Ten months to Oct. 31:				
Gal., H. & S. An.	$2,554,457	$2,320,279	I $234,178	10.1
Louisiana West.	484.492	370,190	I. 114,242	30.9
Morgan's La. & T.	3,246,954	2,731,602	I. 515,352	18.9
Oreg. Short Line.	1,499.926	771,778	I. 726,1 8	94 1
Net earnings	479.591	137.089	I. 342.502	250.0
Tex. & N. Ori'ns.	800,241	691,929	I. 108,312	15.6
Nine months to Sept. 30:				
Gal., Ha. & S. An	$2,230,076	$1,985,639	I. $245,037	12.3
Louisiana West.	424,818	320,251	I. 104,567	32.7
Morgan's La. & T.	2,813,583	2,375,332	I. 438.051	18.4
Tex. & N. Ori'ns.	708,576	610,915	I 97,661	15.9
Month of September:				
Gal., H. & S. An.	$326,718	$206,231	I. $60,487	22.7
Louisiana West.	47.006	35.053	I. 11,953	34.2
Morgan's La. & T.	380,192	288,927	I. 91,265	31.6
N. Y., Texas & Mex	23,546	.....	.....	....
Southern Pacific, Pacific System.	2,013,614	2,313,720	D. 300.106	12.9
Tex. & N. Ori'ns.	77,304	69,518	I. 7,986	11.6
Month of October:				
Gal., H. & S. An.	$324,381	$335.240	D. $10,859	3.2
Net earnings	168,863	175.035	D. 6.172	3.5
Louisiana West.	59.614	49,939	I. 9,675	19.3
Net earnings	32,741	24,154	I. 8,587	35.7
Morgan's La. & T.	433,371	356,070	I. 77.301	21.7
Net earnings	244,091	145,010	I. 99,681	68.3
N. Y., Texas & Mex	26,725	.....	.....	....
Net earnings	9.758	.....	.....	....
Oreg. Short Line.	176,833	113,409	I. 63,424	55.2
Net earnings	60,013	58,899	I. 1,114	1 9
Tex. & N. Ori'ns.	91,665	81,014	I. 10,651	13.1
Net earnings	45,198	38,451	I. 6,747	17.7
Month of November:				
Ala. Gt. South	$98,637	$123,688	D. $25,051	20.2
Buff., N. Y. & Phila	211,028	190,061	I. 20.967	11.0
Net earnings	56 721	39,524	I. 17,197	43.5
Cin., N. O. & T. P.	252,670	231,136	I. 21,534	9.3
Cin., W. & Balt.	142,895	122.661	D. 9,766	6.4
Des M. & Ft. D.	38,305	33,734	I. 4,571	13.6
Mexican National	119,321	122,282	D. 2,961	2.4
Minn. & St. L.	179,638	109,266	I. 10,372	6.1
Minnesota & N.W.	35,242	.....	.....	....
Nash., C. & St.L.	181,488	195,001	D. 14,513	7.8
Net earnings	74,194	82,356	D. 8,162	9.9
N. O. & Nor'east.	75,910	91,964	D. 16.054	17.4
Vicks. & Mer.	64,839	54,029	I. 10.810	20.0
Vick., Shre. & P.	61,058	55,132	I. 5,926	10 8
Second week in December:				
Buff., R. & Pitts.	$25.572	$20 989	I. $4,583	21.8
Canadian Pac.	150,030	107,000	I. 43,000	40.2
Chi. & Alton	175,680	175.831	D. 151	0.1
Chi., Mil. & St. P.	510,000	516,472	D. 6,472	1.2
Chi. & Nor'west.	400,088	448,878	D. 48,790	10.8
C., St. P., M. & O.	109 500	112,300	D. 2,800	2.5
C., I., St. L. & C.	43,980	46,233	D. 2,253	4 9
Illinois Central	300,600	305,291	D. 4,691	1.5
Iowa lines	40.100	40.234	D. 134	0.3
Long Island	42,092	41,007	I. 1,085	2.6
Louisv. & Nash.	266,150	309,400	D. 43,250	14.0
Northern Pacific.	185,000	199.000	D. 14.000	7.0
St. L. & San F.	79,100	85,200	D. 6,100	7.2

Weekly earnings are usually estimated in part, and are subject to correction by later statements. The same remark applies to early statements of monthly earnings.

Cotton.

Cotton movement for the week ending Dec. 18 is reported as follows, in bales:

	1885.	1884.	Inc. or Dec.	P. c.
Interior markets:				
Receipts	179,833	134.653	I. 45.180	33.5
Shipments	132,637	106,238	I. 26,699	25.2
Stock, Dec. 18.	481,239	363,866	I. 117,373	32.3
Seaports:				
Receipts	238,011	258,340	D. 20,329	7.9
Exports	133,566	177,593	D. 44,027	24.7
Stock, Dec. 18	1,019,448	1,015.443	D. 4,005	0.4

The total movement from plantations for the crop year (from Sept. 1) to Dec. 18 is estimated at 4,049,750 bales; the increase over last year is 67,696 bales; over 1883, it is 112,413, and over 1882 it is 185,591 bales.

Anthracite Coal Tonnage.

The percentage of the total anthracite coal tonnage for the eleven months to Nov. 30 credited to each company by the statement of the Official Accountant (published last week) is as follows, comparison being made with the division for last year, and also with the allotment agreed on for the present year:

	Allotment.	1885.	1884.
Philadelphia & Reading	38.85	36.84	36.60
Lehigh Valley	19.60	19 14	19.40
Delaware, Lackawanna & Western	16 05	16 07	16.80
Delaware & Hudson Canal Co.	11.00	10.42	10.90
Pennsylvania Railroad Co	8.00	10 80	10 40
Pennsylvania Coal Co	5.00	4.73	4.50
New York, Lake Erie & Western	1.50	2.00	1.40
Total	100.00	100.00	100.00

The Pennsylvania Railroad Co. is not a party to the agreement under which the allotment for the current year was made. The Pennsylvania Railroad is 2.80 per cent. over the allotment; the Erie, 0.50; and the Lackawanna, 0.02 per cent.; the Pennsylvania Coal Co. falling below 0.27; the Lehigh Valley, 0.46; the Delaware & Hudson, 0.58; and the Reading, 2.01 per cent.

Southern Railway & Steamship Association.

Messrs John Screven, Thomas H. Carter and E. K. Sibley, arbitrators of the Association, have recently made the following decisions on points submitted to them for action:

1. Under the provisions of Article 5 of the agreement, the Board is of the opinion that cotton shipped from local stations to a competitive pooled point, on local bills of lading, is joint traffic when reshipped from that point, and subject to the pool divisions of that point.

2. The Board decides and awards that under the provisions of the Article 16 of the agreement, and by the custom of the Association, the Georgia Railroad and the Richmond & Danville Railroad are "initial roads" at Athens, Ga., and that they are "initial roads" as to western business, and that either road may ask for an apportionment of western business by the Board of Arbitration, the Board to determine whether or not such apportionment shall be made; "*Provided*, that nothing shall be construed to require an apportionment of traffic between Nashville, Chattanooga and points south."

3. In the matter of differentials at Spartanburg, S. C., the Board is of the opinion that the proposition submitted by the Traffic Manager of the Richmond & Danville Railroad Co. to the Traffic Manager of the Central Railroad Co. is fair and reasonable and recommends its adopion. The proposition reads as follows: "To make such differences in favor of Charleston to all South Carolina points reached in common by the Central Railroad (of Georgia) and the Richmond & Danville as were found to exist between New York and Charleston or Savannah, and New York and Richmond."

New Lake Line to Duluth.

Arrangements have been made by Grand Trunk roads to run a line of steamers to Duluth next season for both freight and passenger business. At least three boats will be put on the line.

St. Louis Live Stock Shipments.

Live stock shipments from the yards at St. Louis and East St. Louis in October are reported by the Joint Agent as follows:

Road.	Cars.	Head.	Per ct.
Chic. & Alton	310	11,372	23.3
Wabash	211	8,402	15 9
Ind. & St. L.	383	32,741	29.9
Vandalia	334	39,231	28 3
O. & M	32	2,400	2.6
Totals	1,270	94,146	100.0

The shipments show an increase of 22.3 per cent. over October of last year.

Rates on Fruit from California.

The rate on oranges from California terminal points to Missouri River points, including Minneapolis and New Orleans and points on the Mississippi River, and from thence West, has been reduced to $1 per 100 pounds, at owner risk, in carload lots, which is equal to $200 a car to the points named. From California terminal points to Chicago and common points the rate has been reduced to $1.05, or $210 a carload. From California terminal points to points east of Chicago the new rate is $1.25 per 100 pounds, or $250 a car. This is an average reduction of about $40 a carload, as the former rates were, to points east of Chicago $250 a car, to Chicago and common points $237, and to Missouri River points $200.

New York Railroad Earnings.

The following statements are from reports made by New York companies to the Railroad Commission for the year ending Sept. 30 last:

	Earnings.	Expenses.	Net earnings.
Adirondack	$114,157	$92,990	$21,167
1883-84	103,708	94,268	9.530
Boston, Hoosac Tunnel & West.	500,687	506,521	*5.834
1883-84	464,970	439,139	25,831
Brooklyn Elevated	144,954	123,090	21,864
Brooklyn & Rockaway Beach	43,581	27,345	16,236
1883-84	40,632	29,788	10,844
Catskill Mountains	28,874	12,521	16.353
1883-84	22,083	15 823	6,260
Cooperstown & Susqueh'a Vy.	41,447	28,004	13,443
1883-84	45.923	35,680	10.243
Island (Buffalo)	46,571	31,141	15.430
Lackawanna & Pittsburgh	44.345	82,322	*37,977
1883-84	117,875	205,856	*87,981
Newburg, Dutchess & Conn	131,922	118.450	13,472
1883-84	162,944	176,361	*13,417
N. Y. City & Northern	413,458	348,661	64,797
1883-84	344.393	338,466	5,917
N. Y., Woodhaven & R'kaway	111,986	94,523	17,463
1883-84	149.420	74,702	74,718
Ogdensburg & L. Champlain	572,619	312,310	260,309
1883-84	595,320	383,118	212,202
Prospect Park & Coney I'd	242,662	193,953	48,709
1883-84	275,481	244,034	31,447
Sodus Bay & Southern	85,092	144,856	*59,764

* Deficit.

The Brooklyn Elevated road was operated only about half the year, and for one-half that time for only part of its length. The Lackawanna & Pittsburgh was partly closed for a considerable part of the year.

The New Southern Pool.

The agreement lately entered into by the Louisville & Nashville, the Nashville, Chattanooga & St. Louis, the Cincinnati, New Orleans & Texas Pacific, the Mobile & Ohio, the East Tennessee, Virginia & Georgia and the Memphis & Charleston provides for the maintenance of rates to all competitive points reached by those lines, and for the pooling of gross earnings, with monthly settlements in money. It is apparently intended to work in accord with the Southern Railway & Steamship Association, though including lines outside of that association.

The Commissioner, under the agreement, is to be the executive officer of the new pool. He shall be Chairman of the General Freight Agents' Committee. He shall convene meetings of the General Freight Agents' Committee whenever and wherever he may deem necessary, or he shall do so at the request of one or more members of the committee, and shall preside at such meetings. In the absence of any member or members he shall represent him or them, and his action shall be binding until changed or modified at a subsequent meeting of the committee. Whenever the Committee of General Freight Agents are unable to agree upon matters submitted to them for their decision or action, under this contract, the Commissioner shall decide the question at issue, subject to an appeal as herein provided for; and such decision shall be binding upon all the parties until changed or modified by agreement or by arbitration.

He shall have authority to reduce rates when necessary to meet competition of lines not parties to the contract, but he shall at the same time make corresponding reductions from other points from which relative rates are made. He may raise rates or temporarily withdraw them altogether by any line whenever, in his judgment, it shall be necessary to cause the division of traffic that may from time to time be agreed upon.

He shall have such authority over the general freight agents and their subordinates, and over the Accounting Department of the parties hereto, as may be necessary to enforce the terms of this contract relative to maintenance of rates; and to reqaire information relative to the traffic, to be furnished to him in such form or manner as he may deem necessary. He shall have access, either in person or by deputy or deputies, to the books, papers, correspondence, etc., of any of the officers, agents or employés of the parties hereto that relate to the competitive freight traffic. He shall cause monthly statements of the competitive traffic covered by this contract carried by each of the parties to be furnished to the parties.

RAILROAD LAW.

South Carolina Railroad Legislation.

A number of bills seeking to amend the railroad laws of South Carolina have been introduced in the General Assembly.

A bill to amend the general statutes relating to railroads provides that "it shall be unlawful for any railroad company in its charges for the transportation of freight, or in doing its freight business, to make or to give any undue preference or advantage to or in favor of any person, firm or corporation to any undue or unreasonable prejudice or disadvantage." The Railroad Committee has reported this bill unfavorably.

Another bill to amend the statutes relating to railroads proposes to add a section giving to railroad corporations chartered by the state the power to extend the main track or line of such road from the main track to any point in the vicinity thereof, provided such extension shall not exceed five miles.

Another amendment to the railroad law proposes to strike out an entire section of the statute and substitute another, which provides for one railroad commissioner to be elected by the General Assembly, at a salary of $2,100 per annum, to be paid out of the state treasury. No member of the General Assembly is eligible. The committee report the bill unfavorably.

Another bill simply seeks to repeal the act whereby the number of commissioners was increased to three.

Injury to Passenger—Negligence.

In the case of Freeman against the Central Railroad & Banking Co., the Georgia Supreme Court holds as follows:

1. The Court committed no error in stating the issues to the jury, when he informed them that the plaintiff claimed that the injuries received disabled him from performing his ordinary labor.

2. There was no error in charging to the effect that the burden was on the plaintiff to sustain his allegations as to the injury sustained by him; that, to entitle him to recover, he must produce evidence sufficient to satisfy the jury that he has sustained an injury, and that such injury was the direct and proximate consequence of the defendant's negligence; for to constitute an actionable tort there must be damage to the plaintiff and negligence by the defendant causing the injury. Especially is this true when the question of negligence was fully and fairly submitted to the jury, and they were instructed that they only could find the fact.

3. The charge excepted to in the third ground of the motion of new trial was not error, and did not express any opinion on the facts, when taken in connection with its context. In stating the issues, to say that a party "brings evidence to show," etc., is not to express an opinion as to what has been proved.

4. There was no error, after charging that a railroad, as a common carrier, was bound to use extraordinary diligence to transport passengers safely, and to protect them from injury, in adding that where a casualty occurred it would authorize an inference that it was occasioned by defendant's negligence, and from it the jury might presume negligence.

5. The Court did not go outside the case made by the pleadings in charging that it was the duty of the defendant to provide a safe track, comfortable cars, sufficient couplings, coupling pins, etc.; there was nothing in this to mislead the jury or divert their attention from the real issues in the case.

6. There is nothing objectionable in the charge excepted to in the sixth ground of the motion for a new trial; it is as favorable to the defendant as it could with legal propriety have been, and pointed out clearly the care and diligence that would excuse the defendant for the use of defective machinery in the running and use of its road and cars.

OLD AND NEW ROADS.

Atchison, Topeka & Santa Fe.—A suit has been brought in the District Court at Wyandotte, Kan., to restrain this company from further paying interest on the bonds of the Sonora Railway Co., which it guarantees. The complaint is that the Sonora Co. has never earned interest on its bonds; and that the payment under the guarantee is an injury to the stockholders of the Atchison Co. A temporary injunction has been granted, with the usual order to show cause why it should not be continued. The suit was brought without the knowledge of the stockholders of the Atchison Co., and is said to have been begun by a Mr. Marshall, who recently bought a small amount of the stock. It is believed in Boston, where the Atchison stock is chiefly held, that the suit has been brought for speculative purposes, as some heavy contracts have been made for the sale of Sonora bonds, to be delivered early in January, and the injunction restraining the payment of interest would naturally reduce their price. The amount of the guaranteed bonds is $4,500,000, and their value at present depends entirely on the guarantee, as the Sonora road has been just about earning its running expenses.

Apopka & Atlantic.—Grading on this narrow-gauge road is now completed from Mayo, Fla., on the South Florida road, to Apopka Lake, a distance of 12 miles. Tracklaying is in progress and at latest accounts rails were down for 4 miles from Mayo.

Bangor & Portland.—This company has completed its Martin's Creek Branch, which extends from the main line near Bangor, Pa., southward along Martin's Creek to a junction with the Belvidere Division of the Pennsylvania Railroad at Martin's Creek station. The new branch is about 8 miles long, and affords the large slate business originating along the line of the road a connection with the Pennsylvania Railroad, and at the same time shortens by about one-half the rail distance between Bangor and Easton. It will be opened for traffic Dec. 28.

Chicago, Milwaukee & St. Paul.—This company's engineers have begun the survey for the proposed extension from Ottumwa, Ia., to Kansas City. Two parties are in the field; one working from Ottumwa, and the other from Kansas City northeast. A preliminary line has already been run and it is supposed that the present survey is intended to complete the location of the proposed extension.

Denver, Memphis & Atlantic.—A dispatch from Kingman, Kan., announces that Judge Wall, of the District Court of the county, rendered a long opinion Dec. 19 in the

case of the state of Kansas against this company. The County Commissioners obtained recently a temporary injunction against the delivery of $125,000 of bonds voted in Kingman County to the Denver, Memphis & Atlantic Railroad. The Court now decides that the Denver, Memphis & Atlantic Railroad was chartered as a narrow-gauge railroad, and had no power to build and operate a standard gauge, and that its contract with the county to build and operate a standard gauge was *ultra vires*, and that the bonds issued and in escrow with the Bank of Kingman were null and void. This decision, if sustained, will overthrow all the bonds issued to the road in Kansas by various cities, townships and counties, amounting in the aggregate to about $1,000,000.

Denver & Rio Grande.—Receiver Jackson gives notice that the coupons due May 1 and Nov. 1, 1885, on the first-mortgage bonds will be paid on and after Dec. 18, at the office of Maitland, Phelps & Co., in New York.

Des Moines, Osceola & Southern.—It is stated that the bondholders have completed an arrangement for the purpose of changing this road from 3 ft. to standard gauge and extending it from its present terminus at Cainesville, Mo., to a connection with Kansas City or St. Joseph. These improvements will be carried out under charge of a committee appointed by the bondholders. The agreement was to take effect as soon as approved by $600,000 of the $879,000 bonds, and it is stated that nearly $800 have already been deposited with the American Loan & Trust Co., of Boston. The road is now in operation from Des Moines, Ia., to Cainesville, Mo., 113 miles, and is in the hands of a receiver pending proceedings in foreclosure.

Fitchburg.—This company has had a survey made for the extension of its Peterboro & Shirley Branch from the present terminus at Greenville, N. H., westward 5 miles to New Ipswich.

Florida Southern.—This company is making arrangements to renew the older portions of the road, about 80 miles, with steel rails. This part of the road was originally laid with light iron rails, which have worn very rapidly.

Fort Mason Seneca & St. Johns River.—This company has been organized to build a railroad from Fort Mason, Fla., through Seneca to the St. Johns River, near Hawkinsville, a distance of 26 miles. The line is already surveyed and subscriptions to a considerable amount have been secured.

Georgia Pacific.—The accident at Austell, Ga., of which a brief account was given in our columns last week, has given rise to a controversy between this company and the East Tennessee, Virginia & Georgia, which uses the Georgia Pacific track between Austell and Atlanta. The collision, it will be remembered, was between an East Tennessee and a Georgia Pacific train, and the Georgia Pacific claims that it was caused by the East Tennessee Co. running its trains in violation of the Georgia Pacific rules. This claim the East Tennessee Co. is of course not willing to admit, as it would have, in that case, to pay all the claims for damages resulting from the accident. On the morning of Dec. 21 the Georgia Pacific Co. issued an order that no East Tennessee train should be admitted to its tracks at Austell until that company had assented to an agreement to conform to its rules governing the movement of trains. The order was carried out until a number of East Tennessee freight trains and a passenger train had been stopped and a dead-lock in the traffic appeared probable. Finally, however, a compromise was arranged, the officers of the East Tennessee Co. signing an agreement to conform to the Georgia Pacific rules hereafter; all questions arising before the present date to be left to the courts for settlement, and trains were then permitted to pass.

Greenville & Laurens.—Construction has been in progress on this road during nearly all the present year. It is now reported finished from Laurens, S. C., northwest 28 miles, leaving about 7 miles to be built to complete it to Greenville.

Gulf, Colorado & Santa Fe.—At a public meeting held in Dallas, Tex., Dec. 15, a memorandum was submitted from this company, offering to build from Dallas northward, through Rockwall and Paris, to the Red River, provided the people along the line will vote a subsidy of $200,000, the right of way and depot grounds at all points where stations shall be established. The meeting voted to accept the proposition and a committee was appointed to make necessary arrangements. This extension of the road will be, it is understood, the commencement of the company's proposed line across the Indian Territory to Kansas.

Jacksonville, Tampa & Key West.—On the southern extension of this road from Palatka, Fla., to Sanford, trains are now running to De Land Junction, Fla., 52½ miles southward from Palatka. The work of construction is progressing rapidly toward Sanford.

Jamesville & Washington.—This road, which extends from Jamesville, N. C., to Washington, 22 miles, has been sold to R. M. Evans, of Philadelphia, and associates, who will, it is said, extend the line from Jamesville northward to Suffolk, Va., where it will connect with the Seaboard & Roanoke.

Kansas Railroad Subsidies.—An apparently well-informed correspondent of the Topeka (Kan.) *Commonwealth*, whose remarks are editorially approved, writes a long letter to that paper, from which the following extracts are taken:

"Under certain limitations the counties, townships and cities of this state have power to subscribe for the stock of projected railroads, exchanging therefor municipal bonds in equal amounts. It is a settled principle of law that the courts are to construe these contracts strictly as against the railroads and in favor of the municipalities. Notwithstanding this fact, aid is being voted in many cases in a most careless, not to say criminal, manner.

"While much of this aid is being voted in good faith to responsible companies, in many cases reckless adventurers are rushing through aid propositions for imaginary lines, simply for the purpose of tying up the municipalities, and thus deprive them of the power to negotiate with other and more responsible companies. The state will soon be plunged into a sea of litigation over these bond propositions, which will result in unmeasured injury to the state at large, to the local communities, to all those roads which are being projected in good faith, as well as to Eastern investors, from whom the money must come to push these enterprises to completion. It is time to call a halt. These aid propositions should be submitted to competent lawyers and business men before the people are called to vote on them. * *

"Again, some counties and townships voted aid for railroads several years ago nearly up to their limit under our law of 1876. Now they are again voting large amounts in excess of their ability to deliver. * *

"Some of the new companies have surveyed their lines through the state running to the right and left and in a zig-zag manner from the centre of one township to that of another, paying little regard to alignments, distances or grades. Their lines in some counties lead one to think that they are going through the state on a pair of stairs, and are known as 'worm fence' lines. * *

"The state of Kansas needs some more railroad mileage. Her rapid increase in business and population justify its construction. Her municipalities are willing to show their faith in the future of the state and to inspire eastern investors with confidence by subscribing for stock, where the roads are to be built on business principles, by reliable companies, and as investments for all time.

"The most imminent danger now threatening Kansas is that such enterprises will be tainted and ruined by that other class of schemes backed by the disciples of Col. Sellers, whose only purpose is to excite the credulity of the public, secure local contributions, survey zigzag lines, boom imaginary towns and, finally, on failing to float the scheme in the East, to stand in the way and exact tribute from the more quiet and worthy companies who in the meantime have secured the necessary capital to prosecute work."

Marietta Mineral.—This road has now a line in operation from Marietta, O., to Big Run, 25 miles, most of it being built on the old line of the Marietta & Cincinnati, which was abandoned several years ago when the Baltimore Short line was completed. The company has $389,900 capital stock, with a funded debt of $300,000. The earnings of the road for the year ending June 30 were $5,662 and the expenses $3,465; leaving a balance of $2,197 as net earnings.

Milwaukee, Peoria & St. Louis.—This company has been formed by the consolidation of the Milwaukee & Dubuque Co., of Wisconsin, and the Bureau & Northwestern Co., of Illinois. The purpose of the consolidated company is to build a line from Milwaukee, Wis., southwest to Peoria, Ill., and thence, either by new construction or by use of existing roads, to St. Louis.

Minden Branch.—This road is now completed and in operation from Minden, La., southward 5½ miles to Minton Junction, on the Vicksburg, Shreveport & Pacific. This road has been built by local capital, and will be operated by the company, although making connections with the Vicksburg road.

Missouri Pacific.—The suit of the county of St. Louis against this company has been finally settled. The suit was for the recovery of $700,000 in payment of bonds, which the county issued to the Pacific Railroad Co., of Missouri, in 1865. Under the agreement with the county the company has always paid the interest on these bonds, but when they became due the company claimed that it was not liable for the principal under the agreement, but was only called upon to pay the $49,000 yearly interest in perpetuity, and a suit was brought by the county to determine the question. Pending the trial of this suit the company suspended the payment of the interest, and has paid nothing since June last. The case has not been brought to trial, but the company finally decided to withdraw from its position and offer to pay the $700,000, with interest from the date of the last payment. This offer was accepted, and on Dec. 19 the case was closed by the company giving to the county authorities its draft on a New York bank for $715,478.

Mobile & Ohio.—It is reported that this company has negotiated for the lease of the St. Louis & Cairo (narrow gauge). This line, which extends from East St. Louis to Cairo, a distance of 152 miles, is to be converted to a standard gauge as rapidly as possible. The Mobile & Ohio has been at considerable disadvantage through having no outlet of its own north of the Ohio River, its lines terminating at Cairo. The proposed lease, however, will give it an unbroken line from St. Louis to Mobile. It is understood that a guarantee of 4 per cent. per annum upon the bonds is a leading feature of the proposed lease.

Nashville, Chattanooga & St. Louis.—The statement for November and the five months of the fiscal year from July 1 to Nov. 30 is as follows:

	November.		Five months.	
	1885.	1884	1885.	1884.
Earnings	$181,488	$196 601	$913,982	$1,015,989
Expenses	107,294	113,645	540,735	576,109
Net earnings	$74,194	$82,356	$373,247	$439,880
Interest and taxes			281,472	285,841
Surplus			$91,775	$154,039

For the five months this shows decreases of $102,007 (10 per cent.) in gross earnings; $66,633 (15 per cent.) in net earnings, and $62,264 (41 per cent.) in surplus.

Natchez, Red River & Texas.—A contract has been let for the construction of this road from Frogmore, La., westward 9 miles to Trinity on the Black River, the contractors being George Arnold & Co., of Memphis, Tenn., who are also to put the old section of the road from Vidalia to Frogmore, 16 miles, in good order and build necessary stations and other buildings.

New York, Lake Erie & Western.—Some time ago suit was brought by the Bradford, Eldred & Cuba and the Tonawanda Valley & Cuba companies to recover from this company a deficiency in interest under an agreement made by the former management of the Erie, which, it is claimed, guaranteed to make up any deficiency in the earnings of the road toward paying interest. The two roads named are narrow-gauge lines, extending from points on the Erie into the oil regions of Western New York and Pennsylvania. The present management refused to pay the interest under the old agreement, and in answer to the suit represented that the agreements were illegal and unjust, in the first place, and imposed a heavy burden on the Erie Co., without any corresponding benefit. The case was argued last week before the Supreme Court in New York, and the Court decided in favor of the New York, Lake Erie & Western Co., dismissing the suits.

New York & New England.—A dispatch from Hartford, Conn., Dec. 22, says: "A hearing was had before Judge Shipman, in the United States Court, this morning, on the petition for a dissolution of the receivership of the New York & New England Railroad. The present petition is in behalf of the railroad company, and sets forth that the current liabilities of the company are chiefly paid, that money is on hand for the remainder, and that the condition of the business is such that it should be taken from the Receiver. The answer of the plaintiff and the second-mortgage bondholders offered no objection to the termination of the receivership. Mr. Clark testified as to the ability to meet the interest on the second-mortgage bonds coming due, and that there was on hand $200,000 of preferred stock and $300,000 of second-mortgage bonds which had been freed from the conditions of the trust. The interest coming due on Feb. 1 amounted to only about $105,000.

"George B. Phippen, the Treasurer of the company, and the Cashier of the Receiver, testified to the payment of all the coupons of the first and second mortgage bonds, except $545 on the former, and $320 on the latter, which have not been presented, and to the continued payment of accounts by the Receiver, so that all audited bills had been paid except about $7,000, and that the company had $330,000 in bank to meet the interest on the first mortgage coupons maturing Jan. 1, 1886, and calling for this sum.

"The order for the dissolution of the receivership was then made without opposition. It closes the receivership on Dec. 31, 1885, and, aside from the usual formal provisions, contains a clause continuing the case before the Court, and giving a lien on the property for all debts due until a final settlement is reached. There are also the usual provisions for the payment of all claims of counsel, costs of plaintiff, etc."

New York, Ontario & Western.—This company's statement for the quarter ending Sept. 30 is as follows:

	1885.	1884.	Inc. or Dec.	P. c.
Earnings	$580,582	$615,685	D. $35,103	5.7
Expenses	389,711	442,118	D. 52,407	11.9
Net earnings	$190,871	$173,567	I. $17,304	10 0
Other income	104,308	23,472	I. 80,836	344.0
Total	$295,179	$197,039	I. $98,140	49.8
Charges	115,583	100,200	I. 15,383	15.4
Surplus	$179,596	$96,839	I. $82,757	85.4

Charges include all interest, taxes and rentals accruing for the quarter, whether paid in the quarter or not.

Northern Pacific.—It is announced that this company has completed the sale of 80,000 acres of its Minnesota lands, for $400,000, payable in preferred stock. It is reported that negotiations are in progress for the sale of all the company's remaining lands east of the Missouri River, about 4,000,000 acres in all, to a syndicate which has made a proposal for their purchase.

Ohio & Mississippi.—At a meeting of the English stockholders held in London recently it was stated that the company had a floating debt of about $400,000, and a proposition was made that the stockholders offer to take income bonds to a sufficient amount to fund this. After some discussion a resolution was passed requesting the London committee to confer with the directors and ascertain what further capital is required to off the floating debt and put the line in condition for the most economical working. A resolution was also passed thanking the London committee for its past services, and continuing it with full power to represent the English stockholders.

A meeting of the bondholders of the Springfield Division was held in Baltimore, Dec. 22, to consider the company's proposition to exchange new 5 per cent. bonds for the present 7 per cent. bonds. After some discussion it was voted to reject the proposition.

Ohio River.—This company has decided to extend its road from the present terminus at Parkersburg, W. Va., down the east side of the Ohio River to Point Pleasant, about 60 miles, provided the right of way is given, and work will be begun as soon as the proper arrangements can be made. The road is now in operation from Wheeling to Parkersburg, 94 miles. The extension will be about 60 miles long, and will connect at Point Pleasant with the River Division of the Ohio Central, and through that line with the Chesapeake & Ohio.

Oregon & Transcontinental.—This company announces that holders of its notes which mature Dec. 31 will be paid the principal and interest at the Farmers' Loan & Trust Co. in New York. The amount of the new 3-year 5 per cent. loan is $4,000,000, secured by collaterals, viz.: Northern Pacific preferred at 25, common at 12½, and Oregon Railway & Navigation at 50.

Pennsylvania.—This company is having surveys made for a branch from its new Schuylkill Valley line at New Boston, Pa., to a point near Wapwallopen on the North & West Branch road. This will give it a pretty direct line from the anthracite coal district reached by the North & West Branch to a connection with the Delaware & Hudson Canal Co.'s road at Mill Creek, a distance of about 5 miles, which will give the road a connection with Scranton.

Philadelphia & Reading.—The plan of reorganization prepared by the trustees is now in the hands of the company's counsel, who will examine it and make any alterations which in their opinion may be required to prevent interference with the law. The counsel will probably complete their work this week, when the plan will be finally prepared for submission to the security holders by the trustees.

The committee appointed by the stockholders at the last annual meeting, of which General Collis, of Philadelphia, is chairman, has prepared an elaborate report on the condition of the company, which will be submitted at the annual meeting next month. It will probably be printed and sent to stockholders a week or so before the meeting, in order to give an opportunity for its proper consideration.

Rochester & Pittsburgh.—Mr. Adrian Iselin gives notice that he has decided to give all outstanding stockholders another opportunity to deposit their stock with the Union Trust Co. and receive therefor receipts entitling them to one share of stock of the consolidated reorganized company for every four shares deposited by them. This offer is limited strictly to the stock deposited on or before Dec. 31 next.

The report of this company to the New York Railroad Commission for the year ending Sept. 30 gives the following figures:

Earnings	$1,216,679
Expenses	846,224
Net earnings	$367,455
Interest, rentals and taxes	499,186
Deficit	$131,731

For the previous year the deficit was $209,181, showing a gain of $77,450 last year.

Rome, Watertown & Ogdensburg.—A company has been chartered to build a railroad from this company's line near Oswego, N. Y., southward 13 miles to Volney, with a branch 2 miles long to Fulton. The object of the organization is to build a line connecting this road with its leased Syracuse, Phœnix & Oswego road, without the use of the New York, Ontario & Western track. The incorporators of the new company are all connected with the Rome, Watertown & Ogdensburg.

St. Louis & Cairo.—It is reported that negotiations are in progress for the lease of this road to the Mobile & Ohio Co., which needs an outlet from Cairo northward. The road extends from Cairo, Ill., to East St. Louis, 152 miles, with a coal branch of 9 miles; it is of 3 ft. gauge. The company has $6,500,000 stock and $2,600,000 first-mortgage bonds, on which interest is payable only as earned. Last year the bondholders received 2 per cent. It is said that the terms of the lease provide for the change of the road to standard gauge and a guarantee of 4 per cent. interest on the bonds.

St. Louis, Hannibal & Keokuk.—The United States Circuit Court at St. Louis has confirmed the sale of this road under foreclosure and ordered the Receiver to turn over the property to the purchasers at the foreclosure sale, executing the necessary deed. The purchasers, who were the holders of the bonds of the old company, have organized the St. Louis & Hannibal Railroad Co., which will at once take possession of and operate the road. The capital stock of the new company is $1,000,000 and it will have no bonded debt.

Salina, Columbus & Southeastern.—The charter for this road was filed at Topeka, Kan., on Nov. 27 last, and is a reorganization and extension of the old Memphis & Northwestern and the Parsons & Fredonia organizations. The incorporators are Col. W. B. Stone, of Galena, Kan., the

largest lead mine owner in the United States; Charles H. Blair, of New York; Jas. R. Hallowell, U.S. District Attorney for Kansas; R. H. Lawton, John T. Veach, C. L. Woodruff and F. D. Gill, of Columbus, Kan.

Shreveport & Houston.—This company gives notice that all suits against it have been dismissed and the Receiver discharged and that it has resumed possession of the road, which now extends from Shreveport, La., to the Sabine River at Logansport. At a recent meeting of the board the President was authorized to sign the lease of terminal facilities in Shreveport in connection with the Vicksburg, Shreveport & Pacific road, and also to sign the contract with the King Iron Bridge Co. for the bridge over the Sabine River, which will connect this road with the Houston, East & West Texas, of which it forms the Louisiana end.

Southern Pacific Co.—The following is a comparative statement of the earnings and expenses of the Southern Pacific Co. (whole system, 4,667, against 4,585 miles last year) for the month of September and for the three months from July 1 to Sept. 30:

	September.		Three months.	
	1885	1884.	1885.	1884.
Earnings	$2,868,380	$2,973,249	$7,995,369	$8,257,263
Expenses	1,308,826	1,479,188	3,651,402	4,308,297
Net earnings	$1,559,554	$1,494,061	$4,343,967	$3,948,966
Rent for leased property	139,816	.....	428,136	.....
Balance	$1,419,738	.....	$3,915,831	.....
Add rental Mojave Div.	36,556	.....	109,267	.....
Total net	$1,456.294	.....	$4.025,298	.....
Total charges	$1,076.572	.....	$3,263,630	.....
Net profit	$379,722	.....	$761,468	.....

The charges include interest, sinking funds, taxes, guaranteed dividend on Central Pacific stock and government requirements. For the three months the gross earnings decreased $261,894, or 3.2 per cent., but there was a gain of $395,001, or 10 per cent., in net earnings.

Texarkana & Northern.—This line is now graded from Texarkana northward 7 miles, and arrangements are being made to purchase iron and rolling stock. The work so far has been done by local capital, and the intention is to continue the line to Fort Smith.

Texas & Pacific.—The committee appointed to examine the condition of the road last week submitted its report to the board of directors. The report states that the committee, having examined the entire road, equipments, shops, mines, etc., find that the traffic of the road is encouraging, showing an increasing tendency at all points, and that it now produces sufficient profit to meet nearly one-half its interest obligations, which is, however, earned in very different proportions on the several divisions. The immediate expenditure of $4,000,000 in the improvement of the road-bed and track, in order to prevent a further loss of net earnings and to accommodate the growing traffic of the road, is found by the committee to be an absolute necessity. The physical condition of the road, over extensive portions, is reported to be bad, requiring a large and increasing proportion of the gross earnings to keep it in operation at all.

This state of things results, first, from the modification, by the Construction Committee, of the original plans of construction. Second, from the inferior construction and inferior material used by the construction company. Third, from the inadequate maintenance of the ties, rails and other perishable materials, and the effort to pay interest on an aggregate indebtedness which, including all classes, now exceeds $30,000 per mile of track owned. The expenditures required are summarized as follows: Middle Division, 512 miles, $546,000; New Orleans Division, 336 miles, $1,846,000; and Rio Grande Division, 528 miles, $1,572,000; total, $3,964,000. The above estimates are mostly confined to road-bed and tracks and do not include the equipment, shops, terminals, stations, water, etc., most of which are in fair condition. In good condition, officials of the road estimate that the expenses will not exceed 55 per cent., against 87 per cent. in 1884, an economy which, if accomplished, would of itself add $2,000,000 to the net earnings "on the existing basis of gross earnings, less the cost of raising and carrying the $4,000,000 new money required." The committee is of the opinion that the agreement entered into with the bondholders in December last is wholly inadequate, and that other means must be devised for placing the road in a condition to be safely and economically operated, and for earning and paying to the bondholders as much as may be consistent with that prime necessity. The committee has considered the possibility of making use of the terminal bonds, as proposed in the arrangement referred to, the only resource for such a purpose now possessed by the company, with the following result, viz.: Whole issue of terminal bonds, $6,500,000; amount necessary to reserve for the funding of scrip, being one-half of 9 coupons on $19,748,000 of Rio Grande and New Orleans Division bonds, including those already issued for that purpose, $2,665,980; amount necessary to cover present floating debt of $1,030,000, if sold at 90 per cent., $1,145,000; total, $3,810,980; leaving available for sale, $2,689,020, which amount, even if marketed at 90 per cent., would produce but $2,420,000. "This amount being inadequate for the purpose of properly completing the road, even if the accruing interest on the mortgage bonds could meanwhile be earned and paid, that plan is impracticable, and it therefore seems unnecessary to discuss in this connection any questions concerning the terminal mortgage." Attention is called to the necessity for a general officer resident in Texas, as is required by the law of that state. The committee urge upon the board of directors the absolute necessity of an immediate consideration of the ways and means of completing and restoring the property, and the prompt adoption of such action as the emergency demands.

The board approved this report and resolved unanimously "That it is inexpedient in the judgment of this board, in view of the circumstances recited, to borrow any more money to pay interest not earned, and that immediate steps should be taken to prevent the waste and expense of a multiplicity of litigation, and to keep the property together for the common protection of the owners and creditors of all classes, by invoking for it the protecting administration of the law if found to be temporarily necessary."

The result of this action was the appointment of the receivers, as noted briefly from the dispatches last week. The appointment was made by the United States Circuit Court in New Orleans, on the application of the Missouri Pacific Co. as a creditor for advances made.

Texas & St. Louis.—In St. Louis, Dec. 16, the United States Circuit Court made a final order directing the Special Master to sell the Missouri and Arkansas Division at public sale on Feb 22 next. The Court fixed the minimum price to be received at $1,000,000.

Tidewater Pipe Line.—This company has secured the right of way for the extension of its oil pipe line from the present terminus near Williamsport, across Pennsylvania and New Jersey to Constables Hook on the Kill von Kull near New York bay. It is understood that a double line of 6-inch pipe will be laid.

Union Pacific.—This company's statement for the quarter ending Sept. 30 and the nine months to the same date is as follows:

	Quarter.		Nine months.	
	1885	1884.	1885.	1884.
Earnings	$7,154,248	$7,280,436	$18 378,778	$18,274,254
Expenses	3,934,293	3,543,872	11,884,137	11,177,966
Net earnings	$3,219,955	$3 736,564	$6.494,641	$7,096,288
Income from outside investments, etc.			530,963	202,397
Total income			$7,025,604	$7,298,685
Interest, sinking funds, etc			5,797,837	5,751,999
U. S. requirements			786,889	858,019
Total charges			$6,584,726	$6,610,018
Surplus			$440,878	$688,667
Received from trustees, K. P. mortgage			75,840	400,000
Total surplus			$516,718	$1,088,667

The expenses above include taxes, which were $678,543 for the nine months this year and $640,241 last year.

During the first nine months of 1884, the proceeds ($400,000) from sales of lands belonging to the Kansas Pacific land grant were paid over to the company under the terms of the consolidated mortgage, and applied to the payments of coupons of bonds secured by that mortgage. During the similar nine months of the present year cash received from such sales, amounting to $711,129, has been retained by the trustees and applied to the purchase and extinguishment of $722,000 of the outstanding bonds. If this sum had been received by the company and applied to the payment of current interest, as was done in 1884, the total surplus income for the first nine months would amount to $1,227,847, against a total surplus of $1,088,667 for the same period of the previous year, or an increase of $139,180.

The following are statements of the floating debt of the company as it stood on June 30, 1884, June 30, 1885, and Sept. 30, 1885:

	June 30. '84.	June 30, '85.	Sept. 30,'85.
Liabilities:			
Bills payable	$7 205.533	$7,575.000	$5,960,000
Accounts payable	2,542,423	1,516,833	1,609,898
Pay rolls and vouchers	1,999.996	2,242,676	2,227.418
Dividends unpaid	33,884	72,665	71,970
Coupons unpaid	1,276,182	1,265.622	342,907
Called bonds	32,000	96,000	50,000
Due the United States under the Thurman and other acts	916,704	.....	.....
Totals	$14,026,724	$12,868,199	$10,262,195
Assets:			
Cash	$1,192,070	$1,211,855	$1,101,046
Company stocks and bonds	2,072,353	3,167,460	2,516,268
Sinking fund in hands of trustees	62,000	135,694	50,977
Bills and accounts receivable	2,013,419	3,548,396	3,752,751
Totals	$6,209,842	$8,063,408	$7,421,043
Net debt	$7,816,881	$4,704,790	$2,841,152

The decrease of $2,606,004 in gross floating debt since June 30 has been accomplished by the application to its reduction of net receipts, and the proceeds of the sale of the following bonds: $200,000 Atchison, Colorado & Pacific first 6s; $585,000 Kansas Pacific consolidated mortgage 6s; $200,000 Union Pacific sinking fund 8s; $1,180,000 Oregon Short Line first 6s. The gross amount realized from the sale of the above bonds was $2,032,785, or 93.9 per cent. of their par value. In addition to the above, $550,000 Kansas consolidated 6s were sold for $526,625 during October. This transaction was subsequent to Sept. 30, and does not affect the statement of floating debt for that date. But few of the bills payable, which form the unpaid balance of the floating debt, mature until after the close of the current year. This fact has prevented a further reduction of the floating debt. None of the bills payable of the company which have matured since Oct. 1 have been renewed.

During the nine months ending Sept. 30, the funded debt of the company has been decreased in the sum of $1,617,602. The decrease is distributed among the securities of the entire system, the largest reduction being in the Kansas Pacific consolidated mortgage bonds, of which $722,000 were actually purchased and canceled.

The sinking fund, established under the Thurman act, in the treasury of the United States, was at the close of the quarter $4,505,130.47, as against $5,522,343.72 on June 30, 1885.

Western North Carolina.—Heretofore the East Tennessee, Virginia & Georgia trains have run over 8 miles of this road, between Warm Springs, N. C., and Paint Rock, and the transfer of business between the two roads has been made at Warm Springs. The company has now, however, put in the necessary sidings and transfer station, and the exchange of business will hereafter be made at Paint Rock.

West Shore.—The Referee in the foreclosure suit is rapidly paying off the claims against the old company with the money paid in by the purchasers. Among other payments made last week were $1,067,412 to Pullman's Palace Car Co., $301,884 to the Rogers Locomotive works, $492,247 to Woerishoffer, of New York.

The $6,000,000 certificates exchangeable for bonds, which were offered by Drexel, Morgan & Co. last week, were taken at 98.26 by a syndicate represented by Winslow, Lanier & Co., the highest bidders. The total amount of the bids received for these certificates was $22,860,000.

ANNUAL REPORTS.

New York Central & Hudson River.

An abstract of the annual report for the year to Sept. 30, 1885, has been issued. It shows an increase of 17¼ miles in the length of tracks, making it 2,770½. In equipment there is one more dining car than there was the year before, but one less first-class passenger car, and a *decrease* of 186 in the number of freight cars (to 24,744) (also a decrease of $74,400 in the charge for freight cars in the capital account). The cost of the whole property increased $115,693 during the year.

The work done is reported as follows:

	1883-84	1884-85.	Inc. or Dec.	P.c.
Train mileage:				
Pass. trains	6,425.258	6,215,121	D. 210,137	3.3
Freight trains	10,027,577	11,364.362	I. 1,336,785	13.3
Total	16,452.835	17,579.483	I. 1,127,648	6.8
Pass.-miles	387,829 886	438,397,774	I. 50,567,888	13.0
Ton-miles	1,970,087,115	2,137,824,205	I. 167,737,090	8.5
Tons freight:				
Through east	1.182,988	1,416,687	I. 223,699	19.0
" west	312.078	299,210	D. 12,868	4.0
Way east	5,365,548	5,914,786	I. 549,238	10.2
" west	3,351,804	3,172,274	D. 179,. 30	5.4
	10,212,418	10,802.957	I. 590,539	5.8
No. passengers:				
Through	136,736	142,034	I. 5,298	3.8
Way	10,921,263	12,605,767	I. 1,684,564	15.4

The statement of different articles of freight carried is as follows:

Tons.	1883-84.	1884-85.	Inc. or Dec.	P.c.
Flour	748,189	738,436	D. 9,753	1.3
Grain	1,499 999	1,810.505	I. 310,506	20.7
Live stock	464,626	446,593	D. 18,033	3.8
Meats and provisions	218,362	303,607	I. 85.245	39.0
Oils	219,400	246,329	I. 26,929	12.3
Lumber	667.917	724,016	I. 56,099	8.4
Iron and steel	278,906	282.127	I. 3.221	1.2
Ores	219,392	123,935	D. 95,457	43.5
Coal	2,399,446	2,384,424	D. 15,022	0.6

The earnings and expenses were:

Earnings:	1883-84.	1884-85.	Inc. or Dec.	P.c.
Passengers	$7,533,213.49	$6,219,639 22	D. $1,313,574 27	17.4
Freight	16,434,983.06	14,702,598.23	D. 1,732,444.83	10.5
Mails	691,520.29	710,064.45	I. 19,144.16	2.7
Rents	1,319,530.80	1,201,564.58	D. 117,936.14	8.9
Car service	1,009,378.45	.....	D. 1,009,378.45	100.0
Telegraph	7,425 82	7,334 64	D. 91.18	1.2
Interest	420,988.95	811,153.82	I. 390,784.87	93.0
Use of road	313,052.10	319,005.19	I. 5,963.09	1.9
Other sources	419,296.14	457,501.33	I. 38,205.19	9.1
Totals	$28,148,669.10	$24,429,441.44	D $3,719,227.66	13.2
Expenses	17,849,313.15	16,319,372.25	D. 1,529,940.90	8.6
Net earnings	$10,299,355.95	$8,110,069.19	$2,189,286.76	27.0

Charges against net earnings:			
Payments:			
Interest	$3,380,081.85	$3,681,795.48	
Rent of leased lines	1,948,028.20	1,976,028 20	
Dividends paid	7,159,643.72	3,129,990.50	
State tax on capital	178,672.62	167,678.28	
" earnings	123,812.99	108,224.63	
Totals	$30,639,552.53	$25,383,084.34	

In this current year, the amounts received and paid for car mileage are not included in the earnings and expenses respectively, as last year, but the excess of payments over receipts, being the debit balance in the account, has been charged to operating expenses.

The earnings per train mile and per unit of traffic were:

Per ton-mile:	1883-84.	1884-85.
Earnings	0.83 cts.	0.68 cts.
Expenses	0.62 "	0.14 "
Profit	0.21 cts.	0.54 cts.
Per passenger-mile:		
Earnings	1.94 cts.	1.41 cts.
Expenses	1.42 "	1.08 "
Profit	0.52 cts.	0.33 cts.
Per freight train-mile:		
Earnings	$1.64	$1.29
Expenses	1.23	1.01
Profit	$0.41	$0.28
Per pass. train-mile:		
Earnings	$1 17	$1.00
Expenses	0.86	0.76
Profit	$0.31	$0.24
Per cent. expenses to earn	63.41	66.80
Profit per share	$5.22	$2.43
Average train load:		
No. tons freight	196	188
No. passengers	80	70
Per ton	193	198
Per passenger	35	34

The full report will be published later.

Hartford & Connecticut Western.

This company owns a line from Hartford, Conn., to the Hudson River at Rhinecliff, N. Y., 108½ miles, with a branch from State Line to Millerton, N. Y., 1½ miles, making 110 miles in all. The report is for the year ending Sept. 30.

The general account, condensed, is as follows:

Stock		$2,540,300
Old bonds, convertible into stock		179,700
First-mortgage bonds		510,000
Bills and account payable		200,962
Total		$3,439,962
Road and property	$3,239,212	
Materials	69,108	
Cash and accounts receivable	43,411	
Profit and loss, debit balance	79,231	
		3,430,962

Stock was increased $9,600 during the year by the conversion of an equal amount of the old bonds.

The earnings for the year were as follows:

	1884-85.	1883-84.	Inc. or Dec.	P. c.
Earnings	$311,062	$333,826	D. $22,764	6.8
Expenses	300,699	337,488	D. 36,789	10 9
Net earnings	$10.363	$3,662*	I. 14,025	....
Gross earn. per mile	2,828	3,035	D. 207	6.8
Net " " "	94	.....	....	....
Per cent. of exps	96.7	101.1	D. 4.4	....

* Deficit.

All renewals and improvements are included in expenses, as were also $18,442 of accounts coming over from the preceding year. The road earned a small surplus, in spite of unfavorable conditions and depression of business along the line.

Petersburg.

This company owns a line from Petersburg, Va., to Weldon, N. C., 59 miles. The report is for the year ending Sept. 30.

The company has $323,500 preferred stock, $1,000,700 common stock and $1,770,000 funded debt.

The earnings for the year were:

	1884-85.	1883-84.	Inc. or Dec.	P.c.
Earnings	$345.725	$347.132	D. $1,407	0.4
Expenses	188,033	197,635	D. 9,602	4.8
Net earnings	$157,692	$149,497	I. $8,195	5.5
Gross earn. per mile	5,860	5,884	D. 24	0.4
Net " "	2,673	2.534	I. 139	5.5
Per cent. of exps	54 4	57.0	D. 2.6	....

The increase in net earnings was secured entirely by the reduction in the working expenses.

The disposition of net earnings was as follows:

Net earnings, as above		$157,692
Interest on bonds, etc	$119,974	
First-mortgage bonds paid	17,000	
Class B bonds (17,000) bought and canceled	15.364	
Invested in At. Coast Line sleeping cars	2,700	
		155,038
Balance unexpended		$2,654

The report says: "The funded debt has been reduced $34,000. Of the Class A bonds issued by the trustees there are now on deposit and subject to our draft with the Central Trust Co. of New York, $54,000; with the Safe Deposit & Trust Co. of Baltimore, $60,000; and these are in the hands of the trustee to meet the maturing 8 per cent. bonds, as required by the mortgage of $326,000. At the price which these bonds now command they would much more than suffice for this. The Atlantic & Danville Railroad Co.

has crossed our line near Belfield on the same terms as did the Meherrin Valley Railroad."

Ohio & Mississippi.

The company owns a line from Cincinnati, O., to East St. Louis, Ill., 338 miles, with a branch from North Vernon, Ind., to Louisville, Ky., 53 miles. It also owns the Springfield Division, from Beardstown, Ill., to Shawneetown, 224 miles, making 615 miles in all. The statements below have been published for the year ending Sept. 30.

The figures given below for the main line include that line and the Louisville Division, 391 miles in all.

The earnings of the entire line for the year were:

	1884-85.	1883-84.	Inc. or Dec.	P. c.
Freight	$2,063.548	...	...	....
Passengers	1,330,948	...	...	....
Mail, etc	250,971	...	...	....
Total	$3,645,467	$4,139,437 D.	$493,970	11.9
Expenses	2,670,736	3,283,401 D.	612,665	18.7
Net earnings	$974,731	$856.036 I.	$118,695	13.9
Gross earn. per mile	5,928	6,731 D.	803	11.9
Net " "	1,585	1,392 I.	193	13.9
Per cent. of exps.	73 5	79.3 D.	5.8	....

The increase in net earnings was secured by a large reduction in expenses, made in spite of the carriage of a large traffic at low rates.

The earnings and expenses were divided as below, the main line including the Louisville Branch:

	Main Line.	Springfield Div.	Total.
Earnings	$3,269,448	$376,019	$3,645.467
Expenses	2,244,784	425,952	2,670,736
Net earnings.	$1,024.664	$49.933*	$974.731
Gross earn. per mile	8,362	1,680	5,928
Net earn. per mile	2,621	245*	1.585
Per cent. of expenses	68.7	113 3	73.5

* Deficit.

The Springfield Division has always been an unprofitable line, seldom earning its operating expenses.

The result of the year was as follows:

Net earnings, as above		$974,731
Interest on bonds	$1 024,900	
Sinking fund, second mortgage	49,000	
		1,073,900
Deficit for the year		$99,169

The year was a peculiarly unfavorable one in its conditions for this road, and the deficit is hardly as large as might have been expected. For the first quarter of the current year the statements have shown a considerable gain in net earnings.

Cleveland, Mt. Vernon & Delaware.

This company owns a line from Hudson, O., to Columbus, 144 miles. It has been for several years in the hands of a receiver, pending litigation among the bondholders. The following figures are from the Receiver's report to the Ohio Railroad Commissioner for the year ending June 30.

The stock and debt are as follows:

Stock paid in	$1.769,880
Funded debt	4,734,742
Unfunded debt	364,055
Total	$6,868,677

The unfunded debt was reduced $41,586 during the year. Payments for additions to property were $2,439.

The earnings for the year were:

Earnings ($3.368 per mile)	$484,987
Expenses (81 per cent.)	393,071
Net earnings ($638 per mile)	$91,916

As compared with the previous year, the gross earnings show a decrease of 3.1 per cent., the expenses of 2.6 and the net earnings of 5.2 per cent.

Rentals paid were $18,640, leaving a balance of $73,276, which is equivalent to 1.44 per cent. on the total debt.

The road carried 261,775 local passengers during the year and 71,750 through, or a total of 333,525. Its total freight tonnage was 375,506. Of this 35 per cent. was coal.

Long Island.

This company owns a line from Hunter's Point, N. Y., to Greenport, 95 miles, with 87 miles of branches, 182 miles in all. It leases the Brooklyn & Montauk, the Flushing & North Shore, and other branches, making a total of 354 miles worked. The report is for the year ending Sept. 30.

The capital account, condensed, is as follows:

Stock		$10,000.000
Funded debt		5,513,206
Accounts and balances		221,941
Surplus account		639.335
Total		$16,374,472
Road and equipment	$14.087,959	
Advances to branch and leased lines	1,009.447	
Stocks and bonds owned	1,121,683	
Supplies	59,115	
Accounts and balances receivable	44,844	
Cash	51,424	
		16,374,472

There was no material change in stock or bonds during the year.

The earnings for the year were as follows:

	1884 85.	1883-84.	Increase.	P. c.
Earnings.	$2,826,478	$2,756,232	$70.246	2.6
Expenses	1,795,258	1,750.919	44,339	2.5
Net earnings	$1,031,220	$1,005,313	$25,907	2.6
Gross earn per mile	7,984	7,786	198	2.6
Net " " "	2,913	2,840	73	2.6
Per cent of exps	63.5	63 5	.....	...

There was a small increase both in gross and net earnings, both being the largest ever reported by the company.

The result of the year was as follows:

Net earnings, as above		$1,031,220
Interest, less interest received	$207,923	
Rentals	297,559	
Damages for personal injuries	61,093	
Dividends, 4 per cent	400,000	
		966,575
Balance, to surplus account		$64,645

The damages for personal injuries were in settlement of the claims for the Springfield and Hunter's Point collision in the previous year, the amount being so large that it was not included in expenses.

Valley, of Ohio.

This company owns a line from Cleveland, O., through Akron and Canton to Valley Junction, 75.45 miles. Its statement is for the year ending June 30.

The stock and debt are as follows:

Capital stock	$1,201,000
First mortgage bonds	1,600,000
Consolidated mortgage bonds	863,000
Unfunded debt	1,076,417
Total	$4,740,417

The consolidated mortgage is for $3,300,000, of which $1,600,000 are reserved in trust to provide for the first-mortgage bonds.

The earnings for the year were:

Gross earnings ($7,347 per mile)	$554,305
Expenses (58.5 per cent.)	324,412
Net earnings ($3,047 per mile.)	$229,893

The interest charge on the outstanding bonds was $147,780, leaving a balance of $82,113 to be applied on the floating debt.

Richmond & Petersburg.

This company owns a line from Richmond, Va., to Petersburg, 22.5 miles, with a branch to Port Walthall, 2.5 miles, making 25 miles in all. The report presented at the 51st annual meeting is for the year ending Sept. 30.

The earnings for the year were as follows:

	1884-85.	1883-84.	Inc. or Dec.	P. c.
Earnings	$192,651	$195,369 D.	$2,718	1.4
Expenses	97,482	108,299 D.	10,817	10.0
Net earnings	$95,169	$87.070 I.	$8,069	9.3
Gross earn. per mile	7,706	7,815 D.	109	1.4
Net " "	3,807	3,483 I.	324	9.3
Per cent. of exps	50.6	55.4 D.	4.8	....

The President's report says: "The above balance was applied to interest on the debt, the usual 5 per cent. dividends on the stock, and to the work on the James River bridge. Contracts have been made for the completion of the bridge, which will be done by January, at a total cost not exceeding the original estimate.

"The bonds that matured last April have been paid, and the debt of the company has been reduced $11,000 during the year. The property known as the public warehouse, between Seventh, Canal, Eighth and Byrd streets, nearly two acres in extent, has been bought from the state by this company and the Richmond, Fredericksburg & Potomac for their joint use, at a cost of $53,000. The necessity for additional passenger and freight accommodations in this city for the daily increasing trade of the Atlantic Coast Line of railroads constrained the company to acquire this property, even at the very high price paid. It is believed that the additional traffic will justify the cost of the lot and the further outlay needed for proper depot buildings.

"The usual semi-annual dividend of 2½ per cent., payable Jan. 1, has been declared. The road is now laid with steel rails for its entire length, and in all other respects the property has been fully maintained."

Richmond & Danville.

The following preliminary statement was presented at the annual meeting recently, in advance of the publication of the full report for the year ending Sept. 30.

The earnings for the year were:

	1884-85.	1883-84.	Inc. or Dec.	P.c.
Earnings	$3,941,355	$3,800,382 I.	$180.973	4.7
Expenses	2,231,486	2,202,541 I.	28,945	1.3
Net earnings	$1,749,869	$1,597,841 I.	$152,028	9.5
Gross earn. per mile.	5,263	5,024 I.	239	4.7
Net " " "	2.313	2,112 I.	201	9.5
Per cent. of exps.	56.0	58.0 D.	2.0	...

The statement showing the total income and the payments therefrom is as follows:

Net earnings as above		$1,749,869
Interest on investments		17,793
Total		$1,767,662
Interest	$610,647	
Rentals	872,350	
New construction and equipment	221,048	
		1,704,145
Balance		$63.517

The passengers carried were 659,386, a decrease of 1.2 per cent. The freight carried was 1,451,646 tons, an increase of 9.4 per cent.

New steel rails to the amount of 6,000 tons have been put in: 11,000 ft. of sidings have been added, and a full complement of cross ties, say 190,000, have been used during the year in the improvement and renewal of track.

The equipment is well maintained, the motive power being substantially improved by the gradual introduction into the service of locomotives of a heavier and more effective class. Four new locomotives have been purchased, and two passenger, one postal and 88 freight cars built at the company's Manchester shops.

In May last $610,800 of the company's consol bonds, issued under the mortgage of 1867, became due and were satisfied and cancelled, leaving $2,900 that had not been presented for payment.

Portland & Rochester.

This company owns a line from Portland, Me., to Rochester, N. H., 52½ miles. The report is for the year ending Sept. 30.

The capital stock is $588,332. The company has no funded debt. A lease of the road to the Boston & Maine Co. has just been agreed upon.

The earnings for the year were:

	1884-5.	1883-4.	Inc. or Dec.	P. c.
Earnings	$181,901	$183,809	D. $1,908	1.0
Expenses	156,628	158,579	D. 1.951	1.2
Net earnings	$25,273	$25,230	I. $43	0.2
Gross earn. per mile	3,465	3,501	D. 36	1.0
Net " "	482	481	I. 1	0.2
Per cent. of exps	86.1	86.3	D. 0.2	...

The freight handled during the year amounted to 110,856 tons, against 103,689 tons last year, and the passengers carried were 176,829, as compared with 171,723 for year before. Two dividends of 2 per cent. each, amounting to $23,533, have been paid from the earnings. Out of the earnings this year have also been paid 1,108 tons of steel rails and 11,683 cedar ties. Six hundred tons of additional rails and 7,378 ties which have been laid will be charged to the earnings of next year.

Providence & Springfield.

This company owns a line from Providence, R. I., to Pascoag, 228 miles. The statements are for the year ending Sept. 30.

The company has $517,150 stock and $500,000 funded debt.

The earnings for the year were:

	1884-85.	1883-84.	Inc. or Dec.	P. c
Earnings	$102,646	$93,240	I. $9,406	10.1
Expenses	71,906	58,886	I. 13,020	22.1
Net earnings	$31,740	$34,354	D. $2,614	7.7
Gross earn. per mile	4,502	4,089	I. 413	10.1
Net " "	1,392	1,507	D. 115	7 7
Per cent. of exps.	70.1	63.2	I. 6.9	

Trains ran 70,170 miles, the traffic carried being 1,207,459 passenger-miles and 900,422 ton-miles for the year.

Rumford Falls & Buckfield.

This company owns a line from Mechanics' Falls, Me., to Gilbertville, 30 miles. The statement is for the year ending Sept. 30. The company has $500,000 stock and $173,000 funded debt.

The earnings for the year were:

	1884-85.	1883-84.	Inc. or Dec.	P. c
Earnings	$46,757	$48,096	D. $1,339	2.8
Expenses	35,231	35,097	I. 134	0.4
Net earnings	$11,526	$12,999	D. $1,473	11.3
Gross earn. per mile	1,558	1,603	D. 45	2.8
Net " " "	384	433	D. 49	11.3
Per cent. of exps.	75.3	72.7	I. 2.6	....

Interest payments were $13,168, leaving a deficit of $1,643, to which is to be added $19,808 paid for improvements.

The improvements are two new bridges and new steel and iron for track. More than half the track is now steel.

Knox & Lincoln.

This company owns a line from Bath, Me., to Rockland, 49 miles. It was principally built with the proceeds of bonds voted by the towns on the line.

The earnings for the year ending Sept. 30 were as follows:

	1884-85.	1883-84.	Inc. or Dec.	P. c.
Earnings	$138.700	$143,918	D. $5,218	3.6
Expenses	108,000	116,063	D. 8,063	6.9
Net earnings	$30,700	$27.855	I. $2.845	10.2
Gross earn per mile	2,831	2,937	D. 106	3 6
Net " "	627	568	I. 59	10.2
Per cent. of exps.	77 9	80.6	D. 2 7	....

Interest on the bonds is paid by the towns which issued them, the surplus earnings of the road being paid over to them to assist in meeting the charges.

The report shows 90,963 passengers and 41,000 tons of freight carried. The large expenses of the year were due to the large amount of steel rails and ties and ballasting, $42,000 being expended in this direction. At the annual meeting the question of extending the road to deep water at Rockland was referred to the board, with power to act.

Forth Worth & Denver City.

This company owns a line from Hodge, Tex., to Harrold, 144 miles, and its trains use the Missouri, Kansas & Texas track from Hodge to Forth Worth, 3 miles. The statement is for the year ending Oct. 31 last.

The road was extended during the year from Wichita Falls to Harrold, 34 miles, the extension having been completed May 1.

The company has $2,880,000 stock, and $2,570,000 first-mortgage bonds outstanding. The total amount of bonds authorized is $25,000 per mile, or $3,600,000.

The earnings for the year were:

	1884-85.	1883-84.	Inc. or Dec.	P. c.
Earnings	$448,711	$472,162	D. $23,451	5.0
Expenses	251,079	251,160	D. 81	....
Net earnings	$197,632	$221,002	D. $23.370	10.6
Gross earn. per mile	3,533	4,292	D. 759	15.3
Net " "	1,556	2,009	D. 453	22.6
Per cent. of exps.	56.0	53.2	I. 2.8	....

Interest payments last year were $154,200, leaving a surplus of $43,432 for the year, against $77,602 in the preceding year.

Boston, Revere Beach & Lynn.

This company owns a line from East Boston to Lynn, Mass., 8.8 miles, and operates a ferry from the terminus to Boston. It is of 3 ft. gauge. The report is for the year ending Sept. 30.

The general account is as follows:

Stock		$585.800
Net debt		346.499
Balance of profit or surplus		40,768
Total		$973,067
Road and equipment	$783,096	
Boston terminus and ferry-boats	141,869	
Real estate not used for road	48,102	
		973.067

The real estate includes lands and houses on or adjoining the line and a hotel at Beachmont.

The net debt statement is made up as follows: Bonds, $300,000; bills and accounts payable, $13,898; total, $363,898. From this is deducted $17,399 cash, supplies, etc., leaving a balance of $346,499, as above.

The earnings for the year were:

	1884-85.	1883-84.	Inc. or Dec.	P.c.
Earnings	$195,764	$190.254	I. $5,510	2.9
Expenses	114,251	120,602	D. 6,351	5.3
Net earnings	$81,513	$69,652	I. $11,861	17.0
Gross earn. per mile.	22,246	21,620	I. 626	2.9
Net " " "	9,263	7,915	I. 1,348	17.0
Per cent. of exps.	58.3	63.4	D. 5.1	...

The earnings were made up of $180,926 from passengers and $14,838 from rents and miscellaneous. Of the expenses, $93,790 were charged to the railroad, and $20,281 to the ferry.

Payments for interest, etc., were $29,900, leaving a balance of $51,613. From this 6 per cent. dividends were paid, requiring $35,148 for their payment, and leaving a balance of $16,465 to surplus fund. The surplus from previous year was $24,303, leaving a total surplus of $40,776 on Sept. 30 last.

Valley, of Virginia.

This company owns a line from Harrisonburg, Va., to Lexington, 62 miles. It is controlled by the Baltimore & Ohio, but not operated by that company. The report is for the year ending Sept. 30.

The earnings for the year were as follows:

	1884-85.	1883-84.	Increase.	P. c.
Earnings	$118,953	$110,400	$8,553	7.8
Expenses	84,287	76,062	8,225	10.8
Net earnings	$34,666	$34,338	$328	0.9
Gross earnings per mile	1,919	1,718	138	7.8
Net "	559	554	5	0.9
Per cent. of expenses	71.4	68 9	2.5	....

The result of the year was as follows:

Net earnings, as above	$34,666
Rents and interest on county bonds	10,755
Total	$45,421
Interest on bonds paid	45,000
Surplus for the year	$421

A decrease in local and through passenger traffic is accounted for by the withdrawal in the early part of the year of the night express trains, but the loss in revenue is more than compensated for by the reduction in expenses for passenger-train service, which shows a decrease of 43 per cent. There has been only a slight increase in the local freight business, notwithstanding the opening of two additional stations. This has been due to the continued depression in business, especially in the valley, owing to the prolonged drought, and the consequent small and inferior crops.